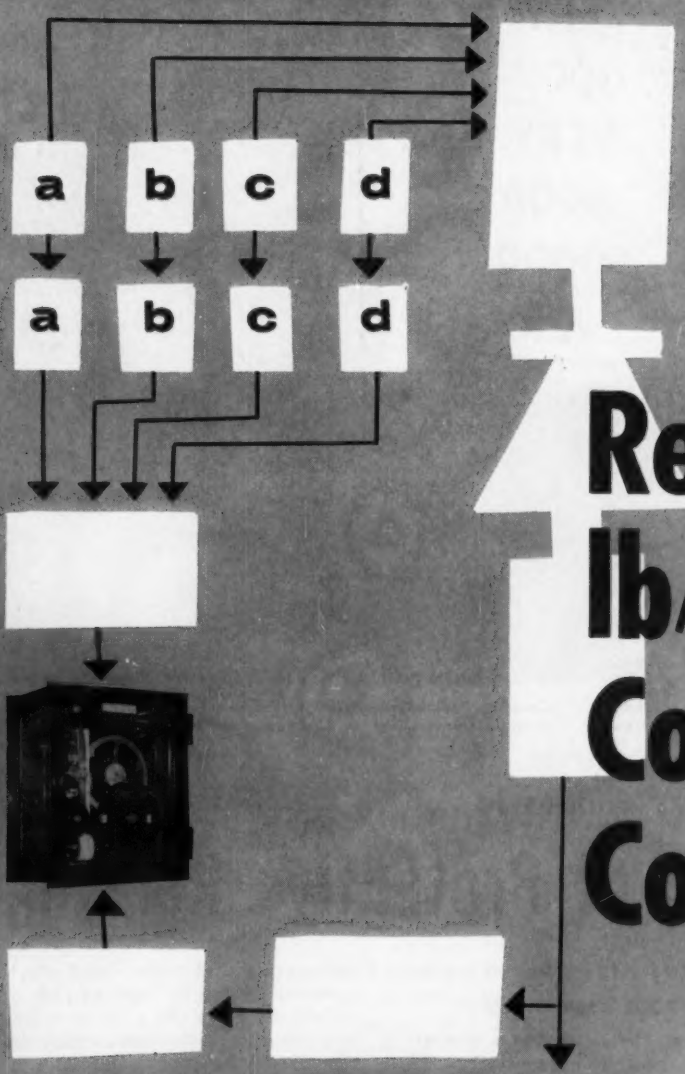
The Electrical Industry's Weekly Magazine

March 25, 1957

Electrical World

Price 35 Cents

A McGraw-Hill Publication



Read lb/kwhr Coal Factor Continuously

...page 94

Development Course Makes Supervisors...page 90

E B POWER GS W 1
UNIVERSITY MICROFILMS
313 N 1 ST
ANN ARBOR MICH

REDUCED ENGINEERING MAN-HOURS can be achieved in planning microwave relaying systems through applying results of a G-E study. Co-author A. J. McConnell, of G.E.'s Engineering Planning and Development Section, discusses one of 25 relaying systems evaluated in the study.

General Electric study enables utilities to . . .

Simplify Planning of Protective Relaying

Microwave communication is being applied on a growing number of electric utility systems. Many of these applications have included protective relaying. Because microwave relaying has high inherent flexibility, relaying system engineers face the difficult task of selecting the appropriate relaying system from hundreds of possible arrangements. A recent General Electric study provides relaying system engineers with a comprehensive method of analyzing system relaying requirements which can greatly simplify planning and thus conserve engineering time. This study should be of even greater aid in solving the more complex relaying problems of tomorrow.

FOUR BASIC SYSTEMS

General Electric engineers studied 25 single-channel relaying systems. For each system they analyzed the relays, the channel, and the combination of the two in terms of these factors: reliability, security, speed, economics, channel space and simplicity. They found that practically all utility applications can be adequately satisfied by choosing one of only four basic relaying systems.

TOWARD STANDARDIZATION

The reduction of the number of relaying systems that must be considered, plus the inclusion of a lengthy section on relaying definitions, marks this study as a major step toward a much-needed standardization of relaying systems and terms. For a copy of "Evaluation of Operating Principles with Microwave Relaying", write General Electric Company, Section 301-354, Schenectady 5, N. Y.

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Published for 83 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 147, No. 12 MARCH 25, 1957

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Wyoming Vetoes Pay for Utility Relocation

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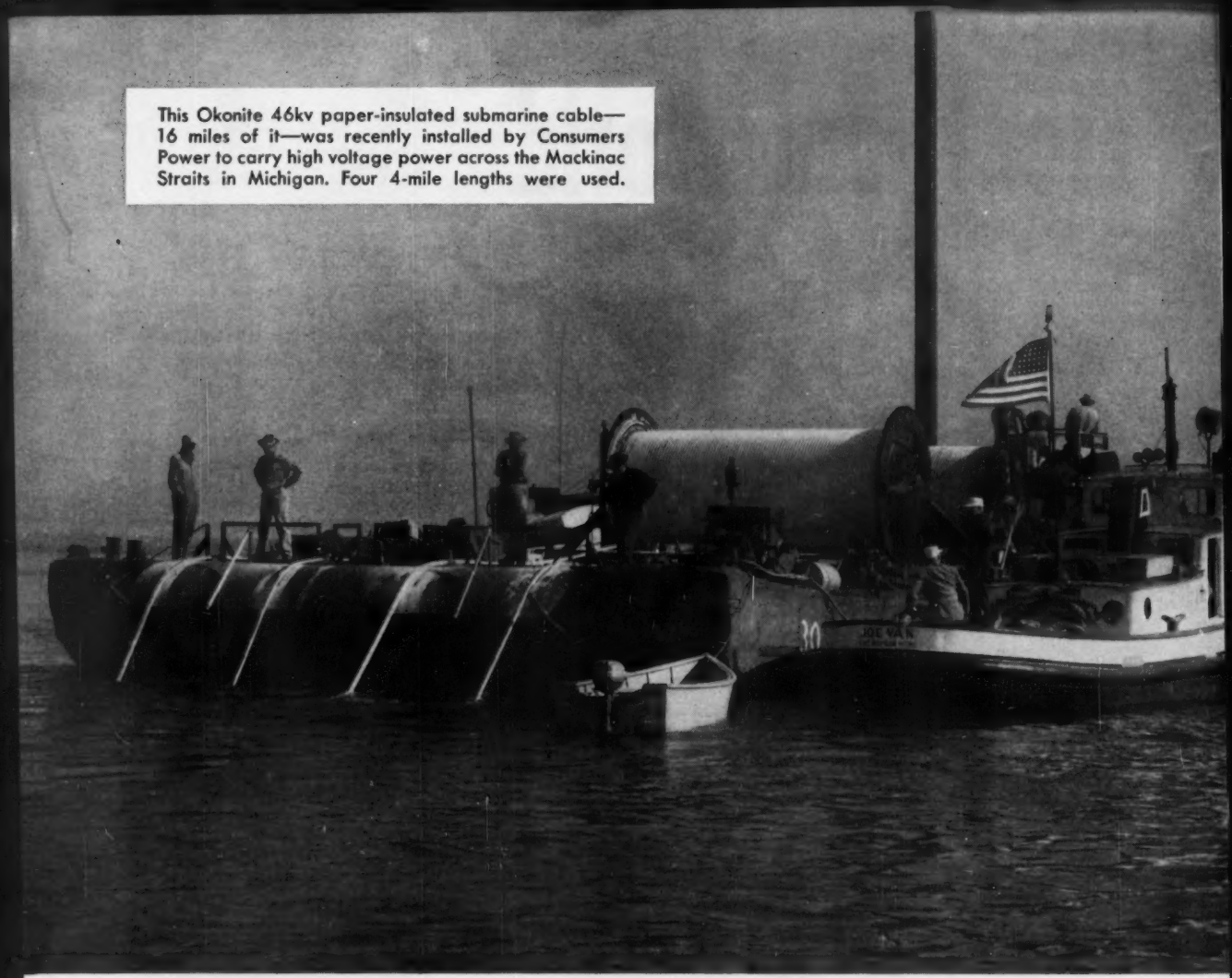

This Okonite 46kv paper-insulated submarine cable—16 miles of it—was recently installed by Consumers Power to carry high voltage power across the Mackinac Straits in Michigan. Four 4-mile lengths were used.

New Consumers Power circuit links upper and lower Michigan for first time

For critical power installations like this one, leading utilities most often place their confidence in Okonite.

Okonite solid type paper-insulated 46 kv submarine cable

Here's why.

With few exceptions, paper-insulated cables are purchased under the basic AEIC specification. But this "spec" does not take into account the experience, the manufacturing methods, or the service records of the manufacturer. And when you buy a cable like the one illustrated above, *these assurances of extra quality are of utmost importance to you.*

Combine these with the carefully researched and tested components of Okonite paper-insulated cables and you have real circuit security. Available with either copper or aluminum conductors, these features are discussed in detail in Bulletin EW-1052. Write for it today. The Okonite Co., Passaic, N. J.

where there's electrical power . . . there's **OKONITE CABLE**

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. . . *from the publisher*

Over and above the regular reporting tasks, the job of any good business publication is to point up industry problems and help its readers to meet them. As the alert newspaper is to the local community, so the alert business magazine is to its industry community—giving editorial guidance to arising problems.

In the electric utility business such problems are not hard to find. And probably one of the most pressing right now is this matter of engineering manpower. The squeeze is on. And for the employer, conditions are not going to get any better very soon.

In recent months Electrical World has turned over much thought and editorial space to the technical manpower shortage. This week our editors hit into it again with a story on engineering recruitment, page 86. Designed to help you make your own recruiting program more effective, it was drawn from recent surveys made by McGraw-Hill and the Engineers Joint Council. It tells you in plain language what engineers look for in a job.

In another project a new EEI Industrial Relations subcommittee is at work on a study to find ways and means of easing the problem. We hope to work closely with this group in supplying data and assistance.

So while engineering personnel troubles mount, some solutions may not be far off. And when they come, you'll read about them first in Electrical World.

Fischer Black

ELECTRICAL WORLD

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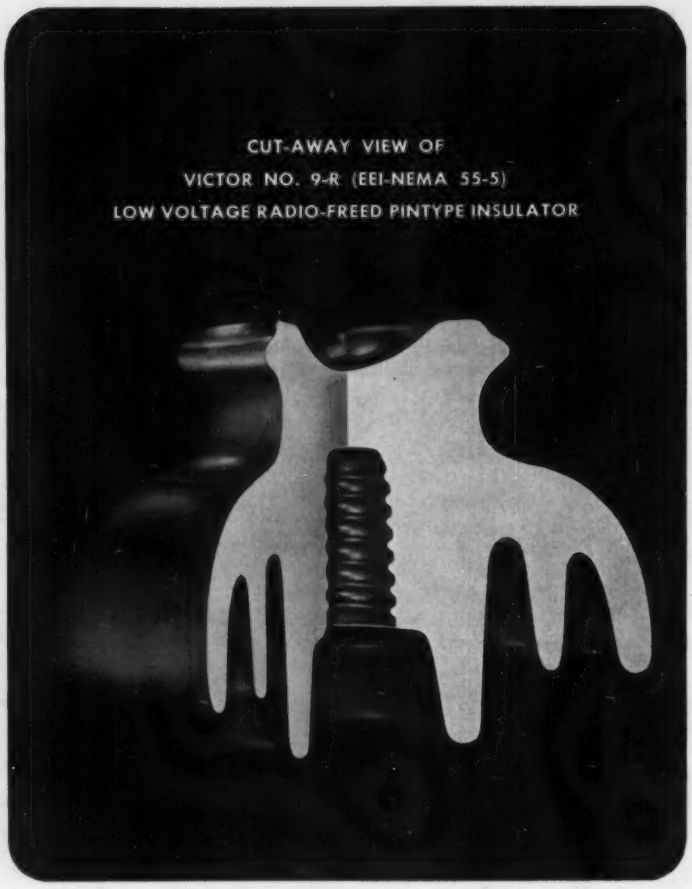
CUT-AWAY VIEW OF
VICTOR NO. 9-R (EEI-NEMA 55-5)
LOW VOLTAGE RADIO-FREED PINTYPE INSULATOR



NO INSULATOR IS MADE WITH GREATER CARE THAN A *VICTOR* PINTYPE!

VICTOR Pintypes are designed and manufactured with the same *Purified* Porcelain as high voltage units. VICTOR Pintypes are design-tested with steep front impulse wave in addition to the normal 1.5 x 40 standard impulse wave.

The conductive glaze on VICTOR radio-freed units is readily *distinguishable* and *permanent*. Accurate, die-formed porcelain threads assure ease of installation. Machine glazing guarantees uniform glaze application, giving optimum dielectric and mechanical strength. *Every* VICTOR Pintype receives the same careful routine electrical testing as VICTOR high voltage insulators. That's why—when you buy VICTOR, you just can't buy better pintypes.

New . . .

VICTOR CATALOG

Now ready for distribution is Victor's newest and most extensive catalog. One of the most complete in the field, it includes illustrations and data on many items being produced at VICTOR and not previously shown, up-to-date EEI-NEMA Standards, and an outline of VICTOR'S new plant, research, testing and manufacturing facilities. It's FREE! Write for your copy.

Nothing beats Porcelain

FOR ELECTRICAL INSULATORS!

VICTOR INSULATORS DIVISION

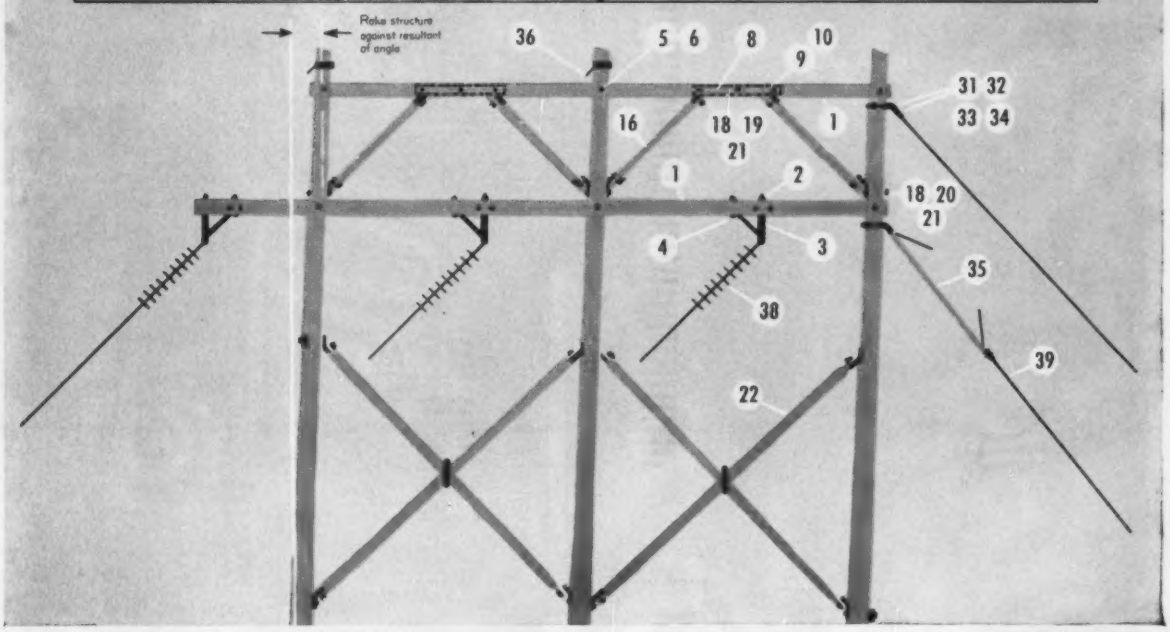
I-T-E CIRCUIT BREAKER CO., Inc.

VICTOR, N.Y.

SMALL ANGLE STRUCTURE TYPE NO. 706

NORMALLY USED FOR ANGLES OF 4° — 15°. ADAPTABLE FOR VOLTAGES FROM 69 TO 154 KV

DRG. REF#	QUANTITY	DESCRIPTION	DRG. REF#	QUANTITY	DESCRIPTION
706	3	Pole	21	7	MF locknut ⅞"
1	4	Crossarm	22	2 sets	Cross base w/fittings, clamp, ⅞" pole bolts, and curved washers
2	3	Spacer fitting w/mfg. bolts			
3	3	Swinging angle bracket			
4	3	Saddle w/mfg. bolts	31	4	Pole band
5	6	Stud bolt ⅞" w/2 washer nuts	32	4 pr.	Connecting link
6	12	MF locknut ⅞"	33	1	Guy roller
8	2	Filler block	34	1	Machine bolt ¾" x 2½"
9	6	Stud bolt ¾" w/2 washer nuts	35	1	Wood guy strain insulator
10	12	MF locknut ¾"	36	2	Suspension clamp for static wire
16	4	Knee brace			
18	7	Machine bolts ⅞" w/sq. nut	38	As required	Suspension insulators and fittings
19	4	Flat washer 4" sq. x ¼". 13/16" hole	39	–	Guying material
20	2	Curved washer 4" sq. x ¼" 13/16" hole			



FROM THE TOP OF THE POLE TO THE BOTTOM OF THE HOLE . . .

ORDER via Graybar

Graybar will deliver complete pole line structures "packaged"—ready to assemble—to the job site.

All fabricating and boring of arms has been done. Hardware is attached. You're assured that every member fits perfectly.

The result? A better structure planned and assembled according to *your* specifications.

The cost? Much lower than that of field assembly. And there's no lost motion in getting the right parts to the job on time.

To complete the "package", Graybar's experienced Outside Construction specialists and field representatives are always ready to help you tackle tough or unusual jobs along with regular service.

Remember, call Graybar *first*—for any transmission or pole line project. We'll gladly furnish help, advice, complete quotations and quality materials engineered and manufactured to assure uninterrupted service to your customers.

611-92

GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

Call Graybar first for... Everything Electrical — GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

New Allis-Chalmers

Ratings of FZO

14.4 kv, 500,000 kva to
69 kv, 3,500,000 kva

A-C ALLIS-CHALMERS

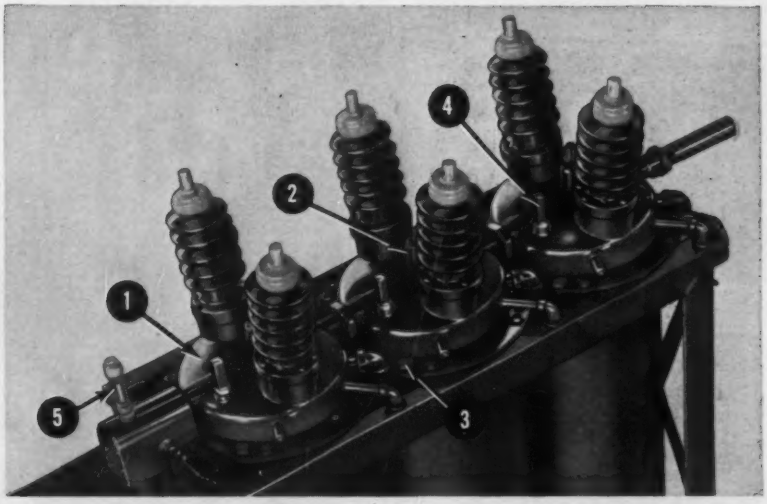
ALLIS-

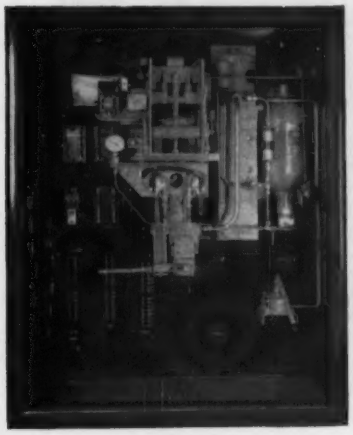
A-5256

FZO frame-type breaker

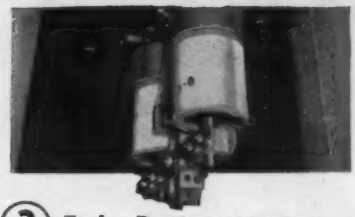
brings you these (4) features:

(1) New Top . . . including (1) self-cleaning, smooth fabricated steel top for each tank; (2) external adjustment of overtravel stop (without using feeler gauges); (3) only four bolts per tank for easy lowering; (4) high visibility float-type oil gauge and (5) ball-type position indicator visible from 360 degrees.





(2) Pneu-Draulic operator has few moving parts . . . has proved itself reliable in dozens of utilities throughout the country . . . provides full-speed emergency closing (using hand pump) even without control power.



(3) Turbo Ruptor device features tulip and bayonet contacts. These lessen mechanical impact forces through tapered design of bayonet and provide wiping action for positive contact. Multiple tulip segments eliminate contact bounce.

(4) Full Access to tanks and contacts. Access is unobstructed by frame members. In addition, lowering of tanks is simple; only four bolts hold each tank to the frame. Full tank skirt is provided on each tank to add stability when tank is on the ground.

...plus power-operated Tank Lifter

Eliminate hand cranking! Let hydraulic cylinders raise and lower tanks safely — effortlessly. This unique A-C feature is a natural extension of the *Pneu-Draulic* operator. Easily installed . . . cylinder rods slip into tank bolt holes at top of tank.

Easy to operate . . . simply open one of two valves to lower tanks — the other to raise tanks.

Safe . . . tanks will lower at predetermined speed even if hose and fittings are accidentally removed.

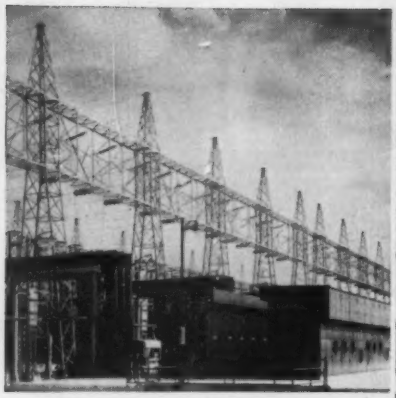
Lifter consists of two hydraulic cylinders and flexible hose. Hydraulic pressure is from the accumulator or pumps of the *Pneu-Draulic* operator system. If breaker doesn't have a *Pneu-Draulic* operator, a battery operated unit is available.

This is only one of many features brought about by the redesign of Allis-Chalmers frame-type breakers.

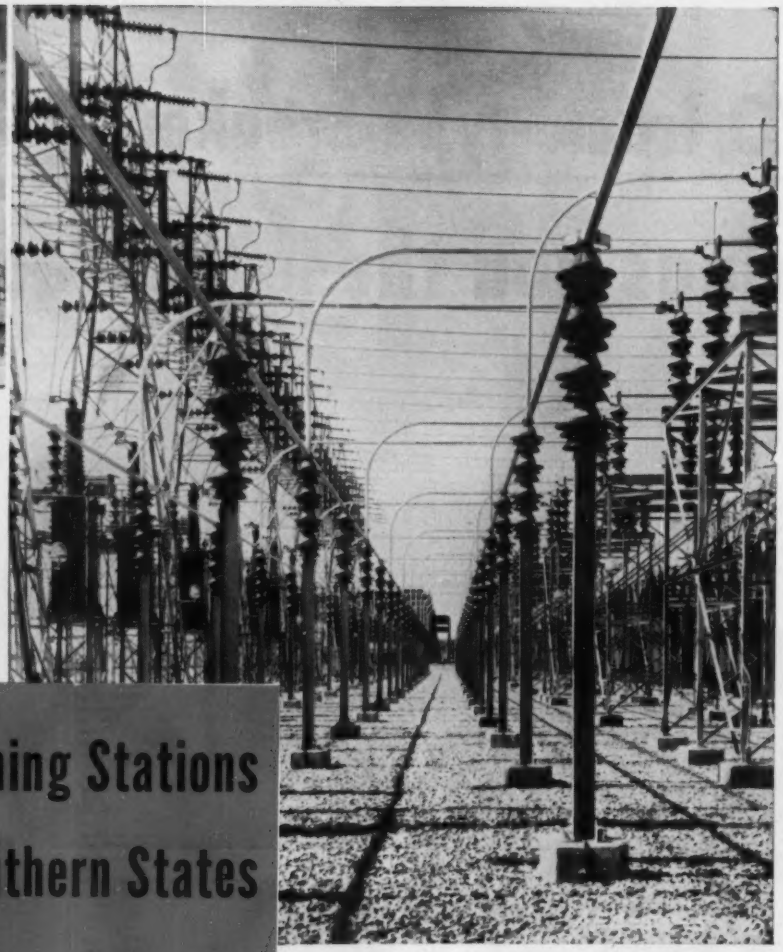
For details see Bulletin 71B8475. Contact your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

CHALMERS

Pneu-Draulic and Turbo Ruptor are Allis-Chalmers trademarks.



PADUCAH, KY.—AEC plant's 25-acre switchyard where two stations supplied by Southern States use a total of 128 Type WAG Air Break Switches.



Paducah Switching Stations Supplied by Southern States

THE ATOMIC ENERGY COMMISSION'S plant at Paducah, Kentucky, has about 25 acres of electrical switchyards. Power fed through the yards is about 17 billion kwh annually. The structures and much equipment for two switchyards in this AEC development were supplied by Southern States—C-31 with 500,000 kva capacity, and C-33 with 1,000,000 kva capacity. Nearly a million pounds of steel were required for the two structures which occupy over one-quarter of a million square feet.

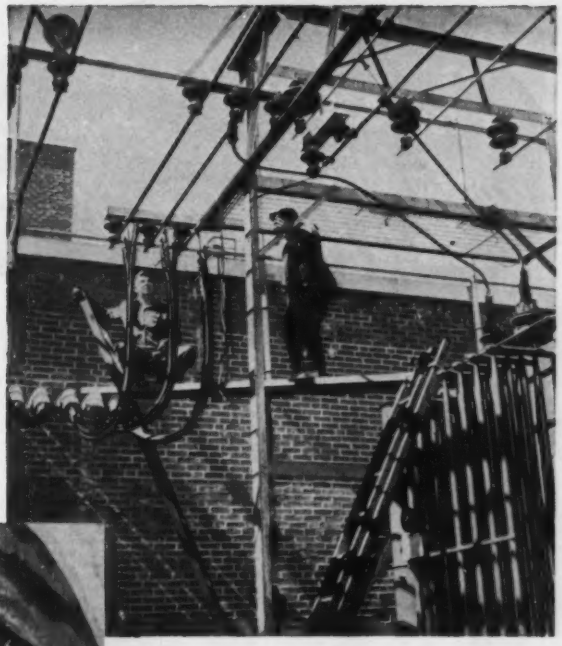
Among the Southern States equipment supplied with the structures were 128 Type WAG Air Break Switches. Of them, 121 were rated 161 kv-1200 amperes; four were rated 161 kv-600 amperes; and three 15 kv-2000 amperes.

This is another example where Southern States equipment was used for one of the nation's largest installations—a fact worth remembering when ordering or specifying equipment that demands dependability and performance.

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

Overhead or Underground



There's never a breakdown with USKORONA tape

On splicing or terminating electrical cables on underground power lines, street lighting circuits and transformer leads, on secondary network systems—to name just a few—Uskorona tape is *essential* because it is the only tape that is resistant to both ozone and moisture. It fuses with and becomes a part of the insulation and gives the same dielectric strength as the original insulation. Naturally, it exceeds A.S.T.M. specifications.

Uskorona® was developed to assure ozone and moisture protection to high voltage lines. Here's how good Uskorona is:

- In a corona-(ozone) resistance test of 4 leading brands, Uskorona was the only tape still intact after 4 hours of exposure.
- Even after 1500 additional hours of continuous exposure, Uskorona remained as fresh and corona-resistant as at the start.

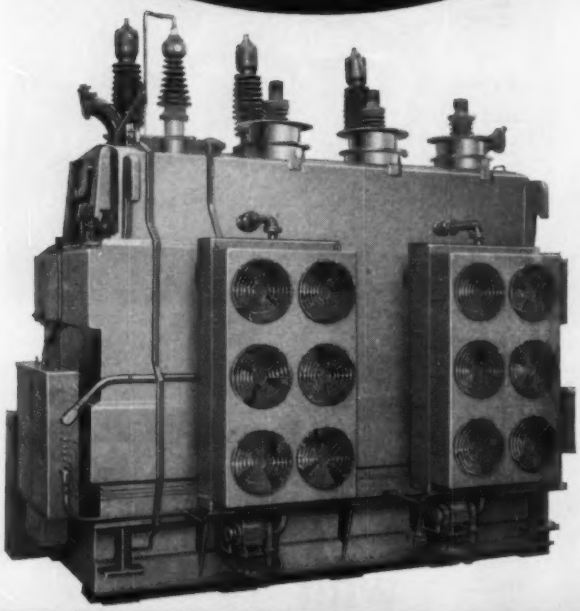
Obtainable at any of our numerous distributors, any of the 28 "U. S." District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y.

Mechanical Goods Division

United States Rubber

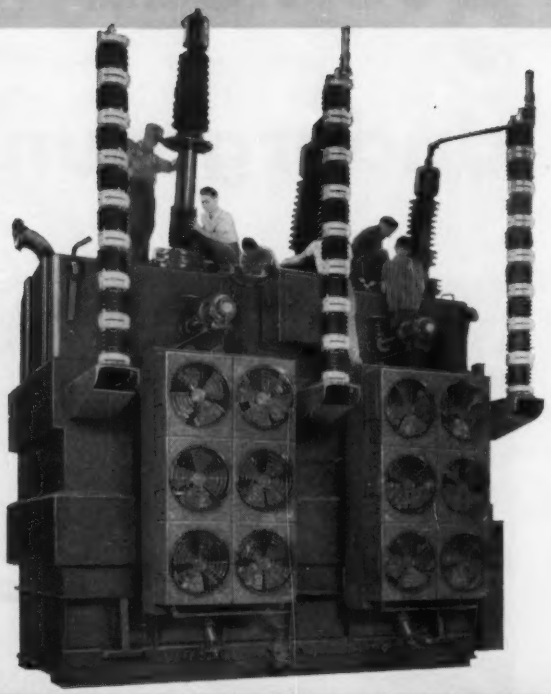
Pioneer in 1-piece upright shipment of large Power Transformers

Main Step-up GENERATING



175,000 Kva

High Voltage: 115,500 Grd. Y volts
Low Voltage: 17,500 Delta volts
Oil-immersed, forced-oil-cooled with forced-air cooler



140,000 Kva

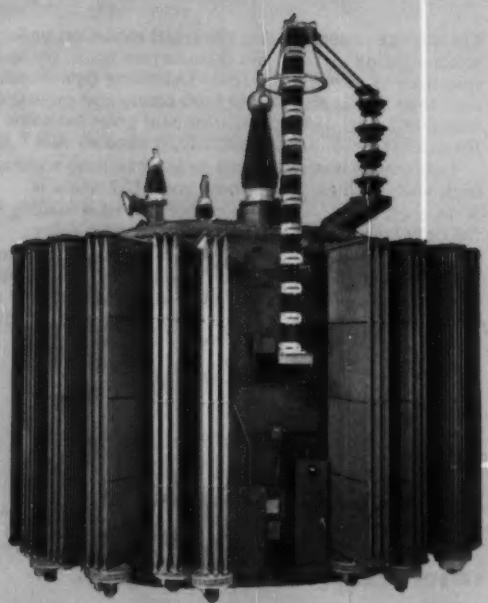
High Voltage: 115,000 Grd. Y volts
Low Voltage: 14,700 Delta Volts
Oil-immersed, forced-oil-cooled with forced-air-cooler

STATION AUXILIARY Transformers

2000 Kva Silicone-Insulated Dry-Type Transformer

Just as Pennsylvania led the way in one-piece shipment of large power transformers, the company also pioneered the development of silicone-insulated units — the fire- and explosion-resistant transformers that are safest of all for both indoor and outdoor installations.

The 2000 kva station auxiliary transformer pictured is a sealed-in nitrogen, dry-type unit; three phase, 60 cycles, 150°C. temperature rise; 2400Δ–480Δ volts.



STATION TRANSFORMERS by PENNSYLVANIA

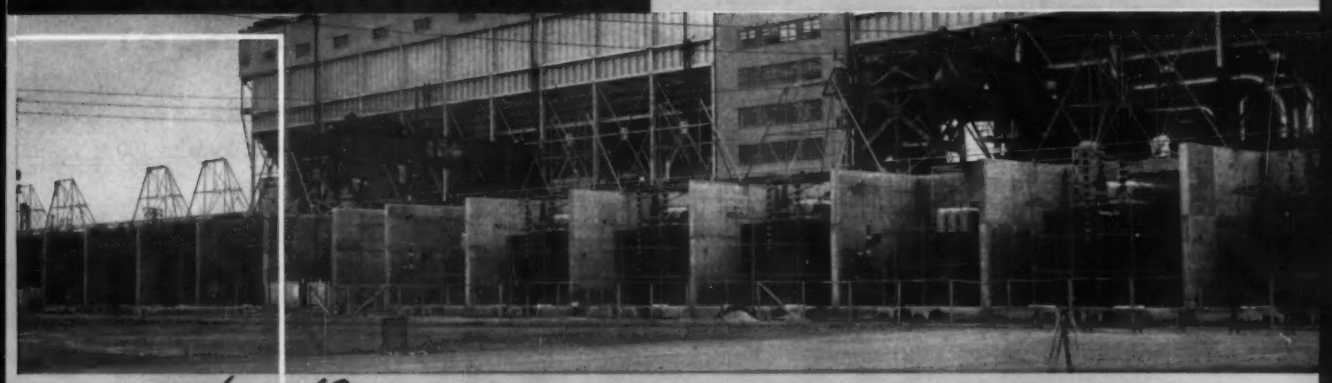
120,000 Kva

High Voltage: 145,000 Grd. Y volts
Low Voltage: 19,800 Delta Volts
Oil-immersed, forced-oil-cooled with forced-air cooler

From the standpoint of kva capacity, the three main step-up transformers pictured at the left can be classified as "large." They range in ratings from 120,000 kva to 175,000 kva. In physical size, however, their dimensions and weights were kept well within the limits for one-piece, upright shipment. This was possible because of the compact characteristics of Pennsylvania's own" contour design," shell form construction.

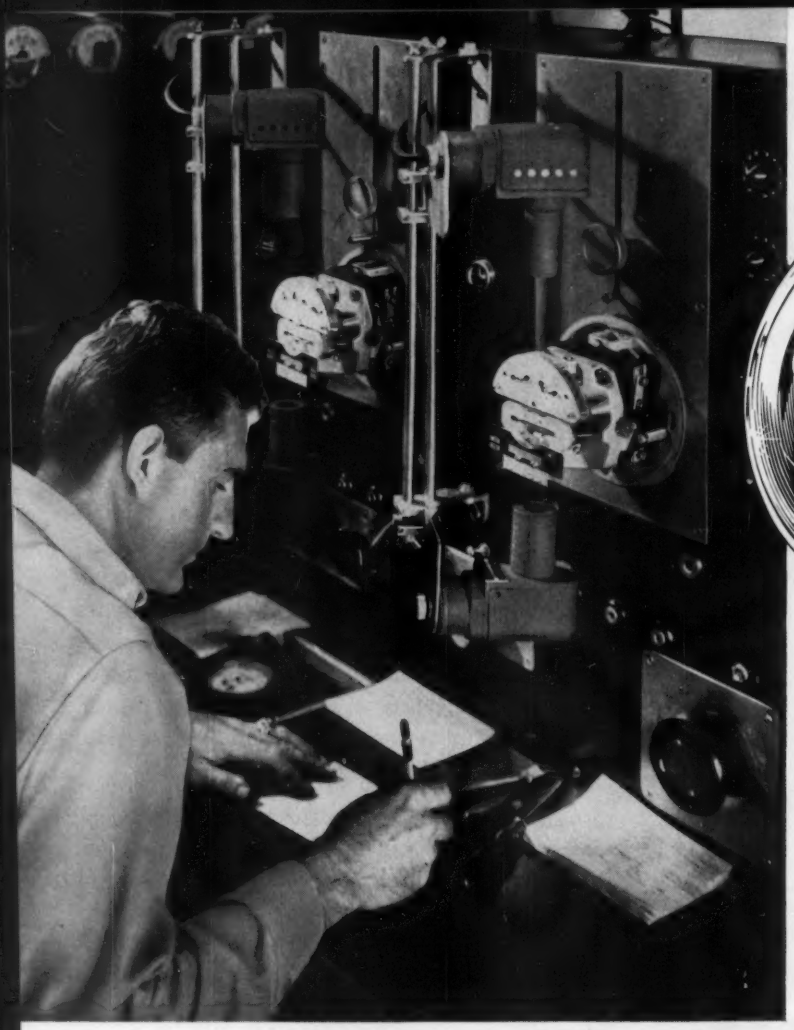
The units traveled to their respective installation sites in an upright position, with only bushings, cooling equipment and certain accessories removed. This meant easier handling in the field, with greatly reduced installation time and costs.

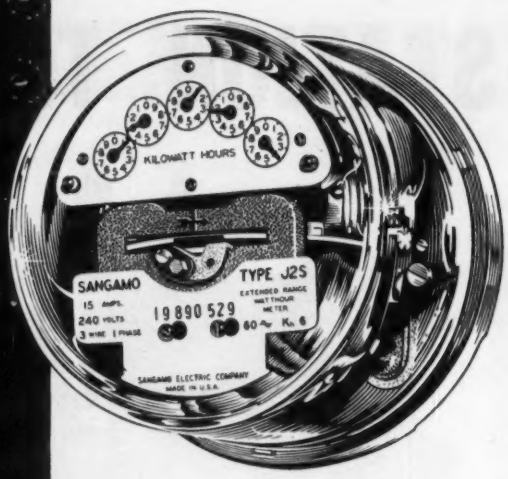
As the pioneer of one-piece upright shipment of large power transformers, Pennsylvania has long been offering this time-saving, cost-cutting advantage with core form transformers also.



These 19 56,000/70,000 kva main step-up generating station transformers, of core form design, were shipped to their destination in an upright position, completely assembled except for bushings and detachable radiators. Of single-phase construction, these transformers have a high voltage rating of 93,000/161,000 Grd. Y volts with a low voltage rating of 19,000 volts.

PENNSYLVANIA TRANSFORMER DIVISION
McGraw-Edison Company
CANONSBURG, PENNSYLVANIA Greater Pittsburgh District





Don't take OUR word for it....

LOOK TO YOUR OWN RECORDS

for proof of watthour meter performance!

For all the *facts* about watthour meter performance—how your meters stand up in actual service... how accurately they retain their calibration... how many are damaged by high voltage surges... how quickly and economically they can be put back into service... and what it costs to keep meters on the line—there's no source more reliable than the meter accuracy records of your own Meter Department. These unbiased records are kept for your information as a company executive.

Sangamo J2 Meters provide:

ACCURATE MEASUREMENT from the lightest loads to 100 amperes for the entire life of the meter.

HIGH INSULATION LEVEL to withstand high voltage surges without damage.

CORROSION-RESISTANCE for optimum performance in humid, salt-laden or corrosive atmospheres.

LIFETIME BEARING SYSTEM—proved by millions of Sangamo Meters in service.

PLUS SLOW SPEED! Only ten disk revolutions per minute at full nameplate rating... another reason why the J2 is your best investment in a watthour meter.

JM 57-2

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

What's *New* about this Guy?

The big new facts about Copperweld* Type M Guy Strand are its economy and its convenience.

Copperweld always has cost less per year of service. Now, this low annual cost is still lower, because prices of every size of the new Type M Guy Strand are lower.

Two Copperweld achievements make this possible:

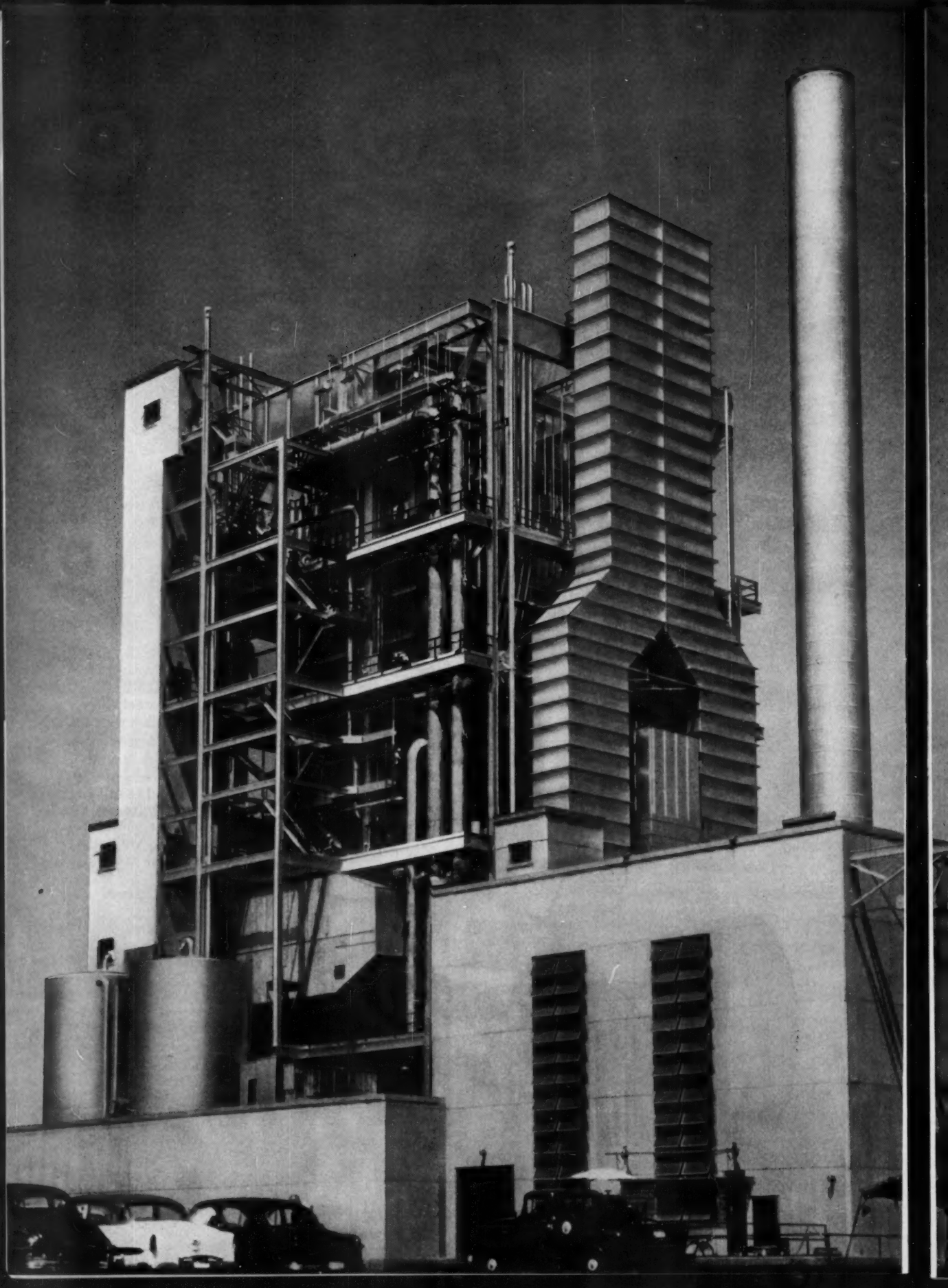
- First, a special new guy strand developed through Copperweld research enables us to meet tensile strength specifications with smaller diameters.
- Second, new guy strand production techniques appreciably reduce the cost of manufacture.

The new Type M Guy Strand is pliable—easy to handle. It can be readily bent, served, moused or clamped. The time-proved Copperweld process, by which the thick copper sheath of each wire is inseparably molten-welded to the steel core, gives full assurance that the copper will not crack, flake or peel.

Copperweld Type M Guy Strand is available in 5 strengths: 3-wire strand in strengths of 2.2M and 4M; 7-wire strand in strengths of 6M, 10M and 16M—and sold in coils of 250, 500 and 1,000 feet. Our field engineers will be glad to tell you about the new economies you can realize through its use.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

*Trade Mark



Advanced B&W Engineering in New Radiant Reheat Boiler Helps Produce

More Low Cost Power for Oklahoma

A B&W Radiant Reheat Boiler, burning natural gas, has gone on the line at the Riverbank Station of Oklahoma Gas & Electric Company at Muskogee. It is equipped with fifteen of the largest gas spud burners ever manufactured by B&W, and is designed for future conversion to coal-burning.

Among Design Features assuring increased station generating efficiency with this boiler is the recirculation of gas for steam temperature control. The gas is introduced without interference with the combustion process. Recirculation of a portion of the flue gas in a boiler makes it possible to obtain the desired steam temperature at specified fractions of full load—an important requirement for top turbine performance.

Natural Circulation is made possible by B&W Cyclone Steam Separators. This brings about really important savings in operating and maintenance costs. B&W's steam separating system insures high purity steam for the turbine and keeps the turbine on the line for longer periods between cleanings. Higher turbine efficiency is consistently maintained.

These B&W engineering advances, plus proved high availability, are major reasons why Oklahoma Gas & Electric has on order two more units similar to the new Riverbank boiler. Other B&W Boilers already are at Mustang Station, Oklahoma City; Horse Shoe Lake Station, Harrah, and Arbuckle Station, Sulphur.

Important to Oklahoma Gas & Electric and its engineers, in selecting B&W Boilers, was the friendly service and excellent engineering so close at hand from the nearby link in a national chain of plants and engineers. Progressive electric companies and their consulting engineers know that nearly a century of steam generating experience supports B&W research, development, engineering, and design. This pool of knowledge is available to you, to help you meet your central station requirements. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, New York.

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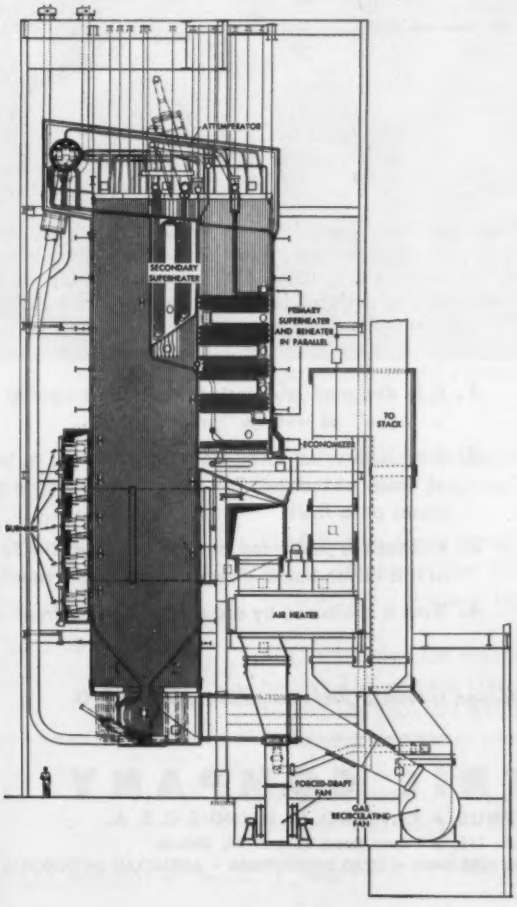
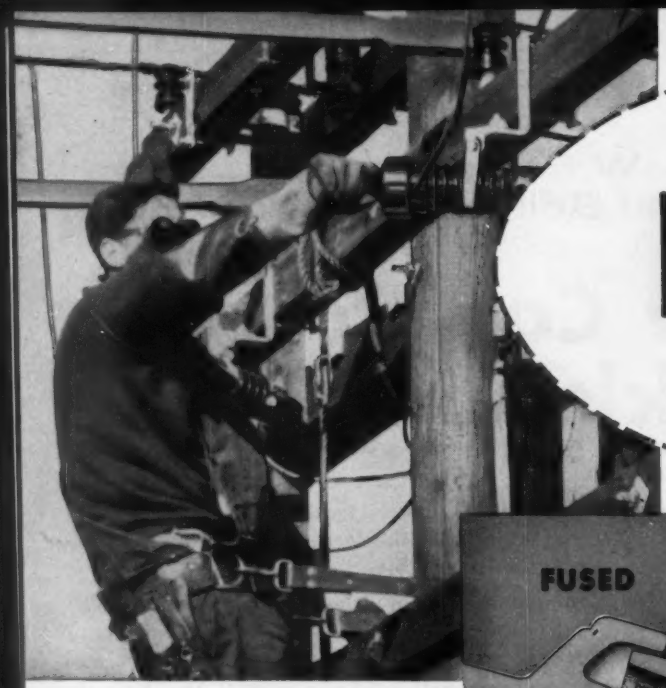


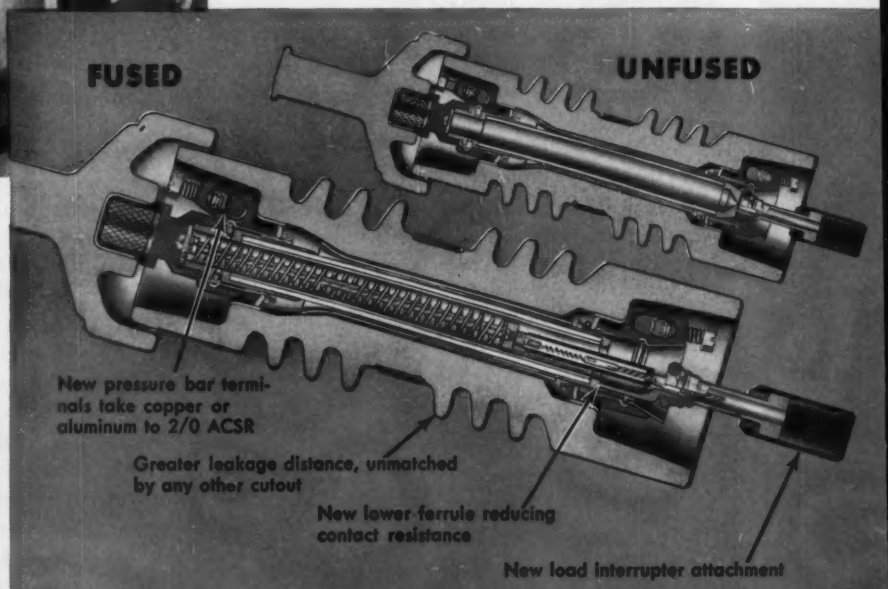
BABCOCK & WILCOX

BOILER DIVISION

B&W Radiant Reheat Boiler at Oklahoma Gas & Electric Company's Riverbank Station. Steam capacity is 1,200,000 lbs per hr. Boiler design pressure is 2150 psi. Steam pressure is 1935 psi at superheater outlet and temperature is 1005F with reheat to 1005F. Sargent & Lundy, Chicago, Consulting Engineers.



. . . a new S&C Positect CUTOUT


FUSED
UNFUSED
New pressure bar terminals take copper or aluminum to 2/0 ACSR
Greater leakage distance, unmatched by any other cutout
New lower ferrule reducing contact resistance
New load interrupter attachment

The fused 100 ampere Positect can interrupt as much as 16,000 amperes, and can switch any steady overload it may be carrying—as much as 200 amperes with a 100 ampere link. Using a disconnect tube (upper picture) converts the Positect into an enclosed load interrupter with full 300 ampere capacity, both continuous and switching.

the only enclosed cutout for switching . . . now with load interrupting ratings to 300 amperes unfused . . . 200 amperes fused

By means of a new load interrupter attachment, the S&C Positect now provides full load switching. This new capability is designed to take care of the heavier loads on today's feeders.

The S&C Positect is the only enclosed cutout for load switching. Moreover, its action is positive. There is no external arc—no exposed hot parts. No links are broken.

Load switching capability is not the only "plus" for the Positect. For short circuit protection it's tops, too, besides having unique safety features for the lineman:

1. It is designed and tested for closing against a fault —"make" as well as "break."
2. Blast is directed away from the operator, so he is out of reach of the arc, flame and "shrapnel" in case he closes on a fault.
3. Kickback is prevented by high inertia of the fuse tube as it is driven home, directly opposing the recoil forces.
4. Blast is minimized by arc shortening and freer venting.

Specialists in High-Voltage Circuit Interruption since 1910

S&C ELECTRIC COMPANY

4421 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U. S. A.

In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario

POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

NEWS-SCOPE

FUTURE NEWS ▶

New, slightly modified, water resources policy statement is due soon from Engineers Joint Council. It leans heavily toward private development of hydro power as did the previous one in 1951, but it'll carry some dissents and qualifications by one public power member of the policy-writing committee.

Several utilities plan trial installations of the "Deioniser" protective system (EW, March 11, p 85). Sun spot activity is said to indicate an active lightning season ahead—and thus should afford a better opportunity for utilities.

Don't discount eventual use of direct current transmission in this country. It is already getting a close look from the long-range planners who foresee a time when 30 to 40-mile underground circuits will be needed to transport power from generating stations to nearby load centers in heavily populated areas.

Here's the way things shape up on a government-backed indemnity insurance program for nuclear power plants: Congressional Joint Committee, following hearings this week, will endorse a program and report the bill to the two houses of Congress. But advocates of a federal reactor development program may hold up floor action on insurance in an effort to tie it in with their proposed federal development program.

LATE NEWS ▶

Plans for the nation's first geothermal power development get underway with formation of Thermal Power Co. The California firm will begin drilling program soon to test quantity of steam available and may arrange to sell power.

New York Senate passes bill which provides that utilities do not have to pay relocation costs in connection with federal highway construction. The bill, which goes to Governor Harriman, would save utilities $80 million (see p 80).

Pacific G&E appeals to California Supreme Court in continued attempt to restrain Shasta Dam Area Utility District from buying Shasta Dam power from the federal government. If case goes to higher court, PG&E says it will be first test of whether the state's PUD's can buy federal power.

A bill to put Oregon in the wholesale power business is being drafted by State Sen Walter J. Pearson. It would enable the state to buy BPA power for resale to private or public agencies and, according to Pearson, would guarantee Oregon a fair share of power from all future federal dams on the Columbia River.

AG&E is taking options on large coal areas in Kentucky for possible future use in a steam plant proposed by Ohio Power for the Ironton, Ohio, vicinity.

First Boston Corp group wins $50 million Public Service Electric & Gas Co 4⅝% debentures due 1977 with a bid of 100.6199%; reoffers at 101.372% to yield 4.52%. Issue is reported "moving along very well."

SEC sets stage for decision on whether Union Electric or any stockholders—namely J. Raymond Dyer and daughter Nancy—can solicit proxies for April 20 annual stockholders meeting. The utility has sought okay to make solicitations before the meeting at which it expects a proxy contest sparked by the Dyers.

Congratulations . . . Georgia Power ups Earl J. Archbold to chief electrical engineer and Edgar S. Harrison to chief mechanical and hydraulic engineer.

EVENTS ▶ **Relocating utility facilities to make way for the vast highway program** will cost a minimum of $200 million over the next decade. Individual states may allocate a part of their road funds for such relocation if they desire. Some states have already agreed to pick up a part of the tab. Others such as Wyoming say "no" **(p 80).**

Looking for a more effective way to recruit engineers? Then you'd better take a look at the two recent studies reported on **p 86** . . . TVA Director Harry Curtis will complete a nine year term in May. Question is: Who will President Eisenhower pick to succeed Curtis? **(p 84).**

ATOMIC PROGRESS ▶ **Electric utilities probably should consider taking a more direct role** in nuclear power development rather than contracting for turn-key jobs, says Chairman Carl T. Durham of the Joint Congressional Atomic Energy Committee. He urges electric companies and rural co-ops to assign supervisory men to such projects **(p 81).**

WASHINGTON ▶ **The FPC staff recommends that licenses be denied Pacific Northwest Power Co** for its proposed Pleasant Valley and Mountain Sheep projects. Rather, said the staff, the Commission should look to the downstream Nez Perce site for a much larger hydro development **(p 83).**

GENERATION ▶ **Device for instantaneous recording of the coal rate** of a large steam turbine unit is in use at Cleveland Electric Illuminating's Lake Shore Plant. Assembled from standard instrument components, this "coal factor" meter eliminates the need for periodic calculations from coal scale and kwhr output to determine the coal rate. Instead of waiting for monthly reports, operators are now able to use the rapid computations as one guide toward operating improvements **(p 94).**

TRANSMISSION ▶ **To boost capacity of a 72-mile section of its 115-kv line** from Elephant Butte Dam to Socorro, the Bureau of Reclamation is doubling the 4/0 ACSR conductor on the line. To protect the heavier installation, all structure guys are doubled for strength against the doubled conductor tension, but the wood-H-frames installed in 1948 are retained. Existing guy wire and clamps are replaced, however it was possible to reuse guy anchor rods and anchors. Hydraulic boom and platform enabled linemen to put in mid-span spacers except at canyon crossings where the existing conductor had to be lowered for working **(p 98).**

Handy guide for construction and operation of power lines over land administered by U. S. Forest Service is found on our Engineering Reference Sheet **(p 112).**

DISTRIBUTION ▶ **Preventive maintenance is a year-round job at Dallas P&L,** and the utility is finding that the more uniform schedule reduces costs, makes better use of manpower, and improves service to customers. Frequent field inspection is one key to the Dallas program. The inspection group issues written requests for specific maintenance jobs. Records are kept of performance and the results of the inspections. The Dallas program appears to be moving toward a centrally directed group under a supervisor. Besides records of equipment performance, outage data, and experienced inspection personnel, the supervisor will need analysts to organize and interpret performance and inspection data **(p 101).**

Novel underground-cable-feeding rig permits much longer runs from riser poles.

Devised by Florida P&L engineers and built by a cable equipment manufacturer, the rig relieves the excessive tension that sometimes develops at the riser ell and helps lift the conduit and cable to the pole **(p 96)** . . . Don't throw away those damaged rubber gloves, sleeves, or blankets till you've read the article on **page 93** . . . Semaphore on a weather-resistant housing denotes position of disconnect switch blades on Los Angeles Department of Water and Power distribution lines **(p 108).**

SELLING ▶ **What's ahead in adequate wiring standards?** You'll read of six anticipated developments in the field as a part of our rundown of the recent Adequate Wiring Conference held in Chicago. The emphasis there was on industry coordination of AW efforts, and there were some pretty gratifying reports as to what is already being done by industry groups in several areas **(p 114).**

Electric heating cables defrost vital railway switches near Erie, Pa. The New York Central has eight of them controlled from Erie. Total connected loads runs 812 kw . . . Conveyorized, infrared baking oven used to dry enamel on small steel stampings and zinc die castings has cut labor costs by over 500% at the Greist Mfg Co at New Haven, Conn. **(p 118).**

MANAGEMENT ▶ **Forecasts for substantial residential load growth this year gets backing** from a recent Federal Reserve Board study on consumer buying plans. Not only do consumers plan larger spending for major appliances, but they are generally optimistic about the longer term business outlook as it affects them **(p 137).**

Course for developing supervisory talent enables Niagara Mohawk to fill just about all of its supervisory positions from within the company. The training course requires two full years of study in theory and practice. A powerful incentive to trainees is the promise of a higher position if they can satisfactorily complete their training. Quotas for the course are based directly on the number of supervisory replacements that are expected within a two-to-three year period. Curricula and counseling methods are discussed in the article **(p 90).**

PEOPLE ▶ **Lee L. Davis is new vice president,** area development, for American Gas & Electric . . . West Penn Power advances Walter Y. Cottom to manager of purchasing **(p 146)** . . . Charles W. Maloney becomes chief electrical engineer for Stone & Webster Engineering Corp . . . Parker J. Davies is superintendent of system operation for Pennsylvania P&L **(p 148).**

MANUFACTURERS ▶ **Ohio Brass enters utility capacitor field** with new line of 25 and 50-kvar units and complete accessories for pole mounting or substation use. Four years of research have gone into these new capacitor designs **(p 130)** . . . "Three-part" rail car for carrying power transformers up to 250 tons will be in operation this summer. Primary benefit offered by the new car is that by lowering transformers to within six inches of the rails, larger ones can be carried **(p 132).**

NEW EQUIPMENT ▶ **New air circuit breaker for 500-Mva, 15-kv service** assures interruption in 5 cycles or less. Zirconium-refractor baffle is said to combine strong heat-shock resistance, high porosity and chemical stability under extreme humidity . . . Addition to line of stringing sheaves can carry 2,500-lb working loads and accommodate cable through 1.75-in. diameter although the sheave weighs only 10 lb . . . New dual voltage distribution transformer has external change-over switch and is available in sizes 10 through 167 kva. It provides standard secondary voltages from these primary voltage combinations 2.4 x 4.8 kv, 2.4 x 7.2 kv, 4.8 x 14.4 kv, and 7.2 x 14.4 kv **(p 124).**

ENGINEERING TRENDS

Standardization may come in the several pressure cylinders of cross-compound and tandem-compound turbines for ratings above the AIEE-ASME preferred standard turbine-generator series. This "building block" approach would capitalize upon advantages of component-parts standardization but coordinate it with natural elements of large machine design to retain the flexibility desired by users to match units to system capacity limitations and fuel vs load factor economy.

Gases or heavy water are the only practical coolants for reactors fueled with natural uranium, according to British nuclear scientists, because the low neutron absorption of these coolants permits the greatest use of neutrons to fission the small concentration of U^{235}. The most efficient gaseous coolants are those with low molecular weight, such as hydrogen, or having heavy molecules comprising a large number of light atoms. In practice, the choice is further limited to gases which are stable under temperature and irradiation conditions in the core.

Automation involves special training for operators at new Wallewarang steam power plant in Australia. The New South Wales Electricity Commission plans to boost pay of successful "students" who must control remotely all turbines, generators, boilers, and auxiliaries, as well as mechanized fuel and ash handling.

Nuclear reactors differ from conventional boilers as energy converters mainly in having very little capacity for storing energy and in their ability to produce energy at a speed heretofor unknown.

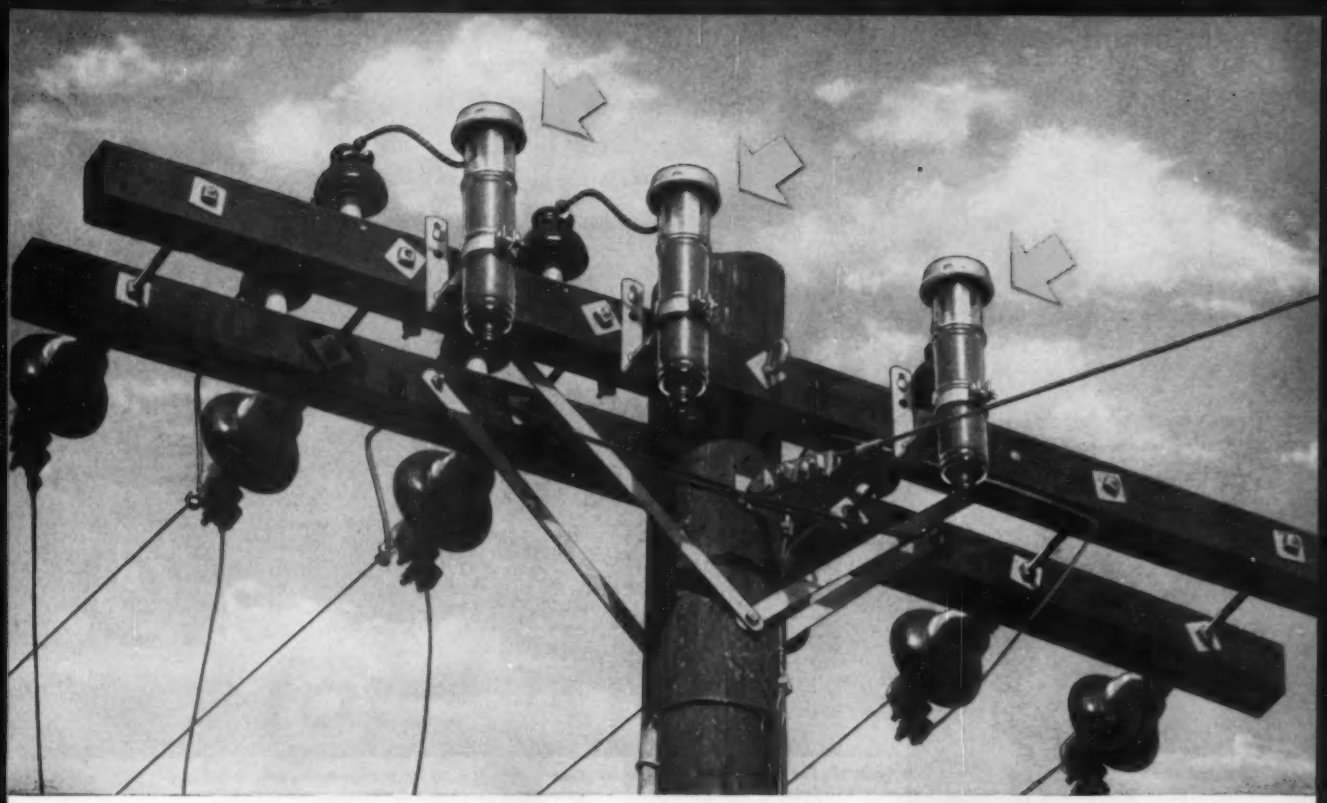
Conversion of light energy into electricity gains new emphasis with the U. S. Commerce Dept's appeal to inventors to devise for the Armed Services equipment capable of powering military devices.

FROM EDITORS IN THE FIELD

Conventional fossil-fueled steam units may reach 750 mw rating by 1980, predicted J. H. Harlow of Philadelphia Electric Co at the recent National Industrial Conference Board panel discussion on prospects for economic nuclear power. Such a unit would use steam at 7,000 psi 1,400F with three reheats to produce electricity at 0.6 lb coal per kwhr. Meanwhile British engineers envision a 550-Mw unit by 1962 to operate at 2,300 psi 1,050F with single reheat, find no economic justification at present in exceeding 1,050F.

Prolonged drought can boost RI and TVI by impairing the grounding of electrical facilities, reports the manager of a Texas rural co-op.

Rising cost of "hog fuel" speeds swing to natural gas for firing boilers of Pacific Northwest utilities. Hog fuel is a residue from sawmills which has long been in ample supply in the lumbering areas.



L-M valve arresters are not limited in application by the available short-circuit current; pass only small values of follow current regardless of system capacity. Heavy-duty spark gap transmits severe discharges without burning or pitting, and allows the arrester to go into action fast.

Eleven-year operating records show...

99.96% Performance Record For L-M Valve Arresters On Utility System

Eleven-year operating records of a large midwestern utility show that L-M valve-type lightning arresters have an outstanding performance record. During this time, L-M valve arresters have accumulated 138,110 service years on this system, and only 51 of these arresters have failed during this span as evidenced by proper functioning of the isolator. Of the 1,873 L-M arresters removed from service because of system changes, all were passed by the utility's electrical test and inspection department and returned to stock.

Positive Protection

L-M valve arresters provide optimum balance between 60-cycle sparkover and impulse sparkover. Heavy-duty spark gap transmits severe discharges without burning or pitting, and allows the arrester to go into action fast. L-M's exclusive valve element assures maximum surge discharge capacity and minimum I.R. drop.

The L-M patented Isolator provides positive protection against feeder lockout in the event of an arrester failure. If the arrester should ever become damaged, the Isolator instantly disconnects the ground lead.

Get Complete Information

Ask your L-M Field Engineer for Bulletin LA-2 on L-M's Type E arrester, which gives specific information on arrester design and performance. Or write Line Material Company, Milwaukee 1, Wis. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ont.

Here are the records for the years 1945 through 1955

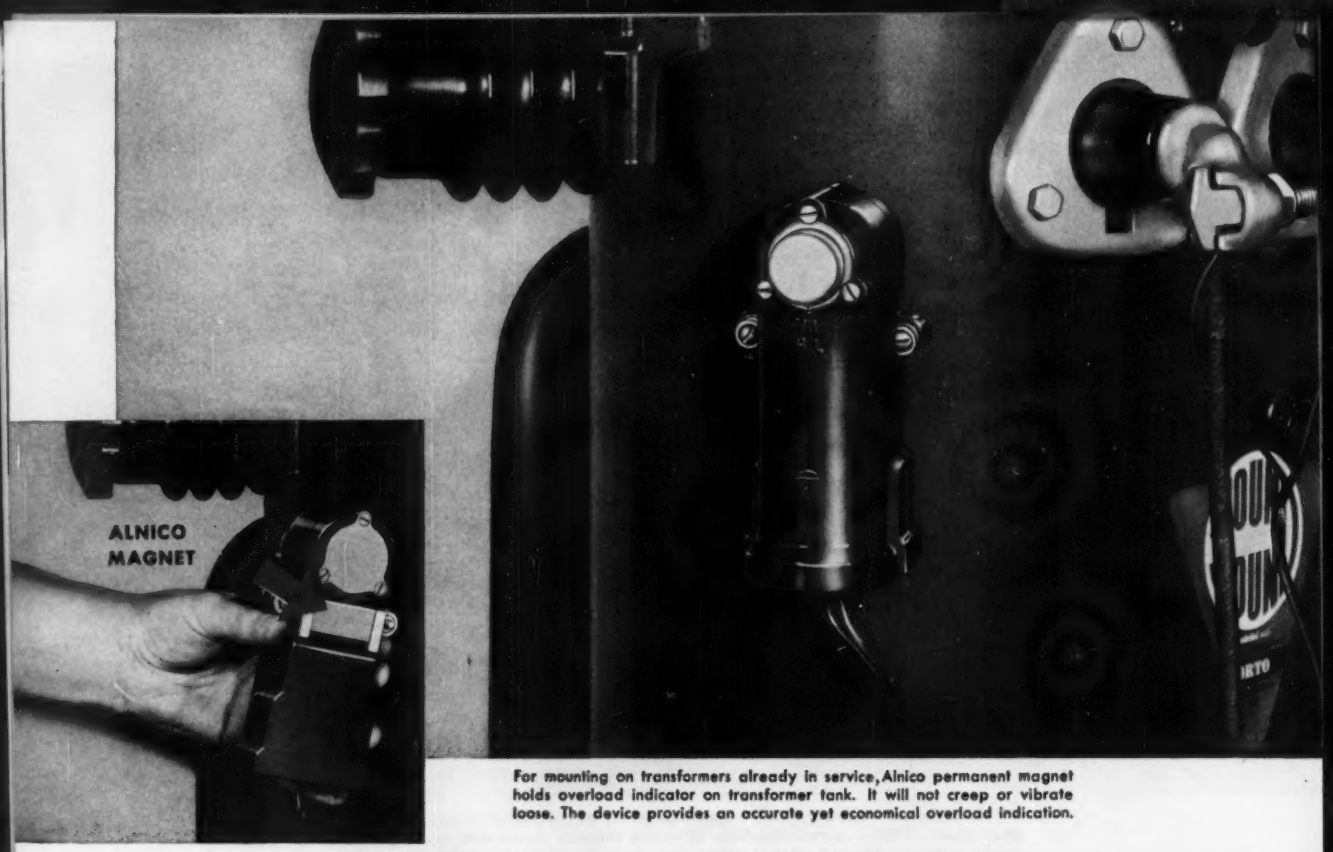
Year	Arresters In Service	Isolator Operations In Service	Arresters Tested	Arresters Failed In Test
1945	3,286	5	0	0
1946	4,322	2	11	0
1947	6,020	2	137	0
1948	7,469	4	118	0
1949	8,686	3	186	0
1950	11,392	7	161	0
1951	13,950	3	270	0
1952	15,282	7	204	0
1953	20,498	13	158	0
1954	21,105	2	383	0
1955	26,100	3	245	0
Total Arrester Service Years	138,110	51	1,873	0

51 ÷ 138,110 x 100 = .036% Failure Rate

279-R

LINE MATERIAL Lightning Arresters

McGRAW-EDISON COMPANY



For mounting on transformers already in service, Alnico permanent magnet holds overload indicator on transformer tank. It will not creep or vibrate loose. The device provides an accurate yet economical overload indication.

New L-M Thermal Overload Indicator Easy To Install; Provides Constant Check

Simply attached and held by permanent magnet; provides continuous overload check; avoids service interruptions.

All you have to do is place the L-M thermal overload indicator against the transformer tank already in service, and it is installed. An Alnico permanent magnet holds the indicator firmly against the transformer tank. The indicator will not creep or vibrate loose. On new L-M Round-Wound® transformers the indicator is attached to a bracket permanently welded to the transformer tank.

This new device provides visible indication of overloads on conventional transformers up to 100 kva by means of a drop-down red light or drop-down luminescent tube. The luminescent type is provided with a nylon cord which can be attached to a cover bolt or other convenient projection to prevent the indicator from falling in the event the pole receives a severe shock.

Continuous Overload Check Without Interrupting Service

The L-M overload indicator provides an economical and reliable solution to load-study problems. It enables you to keep a continuous overload check on your distribution load and also eliminates the costly and laborious work required to take spot load checks.

In addition, the indicator on a conventional transformer does not interrupt service. It serves as a tool to reduce transformer burnouts and maintain service continuity by indicating serious overloads before they can cause trouble.

Compensates For Ambient Temperatures

The overload indicator measures tank-wall temperature (a function of top oil and hot spot temperatures), and makes proper allowance in transformer loading for variations in ambient temperature. Accuracy is sufficient for all practical purposes.

Indication Easily Seen

The overload indicator is available with a red light or reflecting tape. Both types are exceptionally brilliant and easily distinguished in daylight as well as at night. Indicator with red light requires an electrical connection to the transformer.

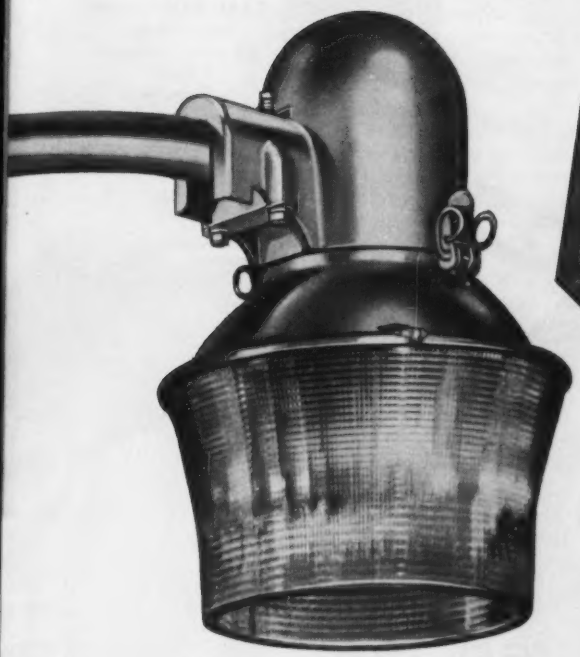
Indicating target is easily seen during the day or night. It is quickly and easily reset by simply pushing the indicating tube up.

Get Complete Information

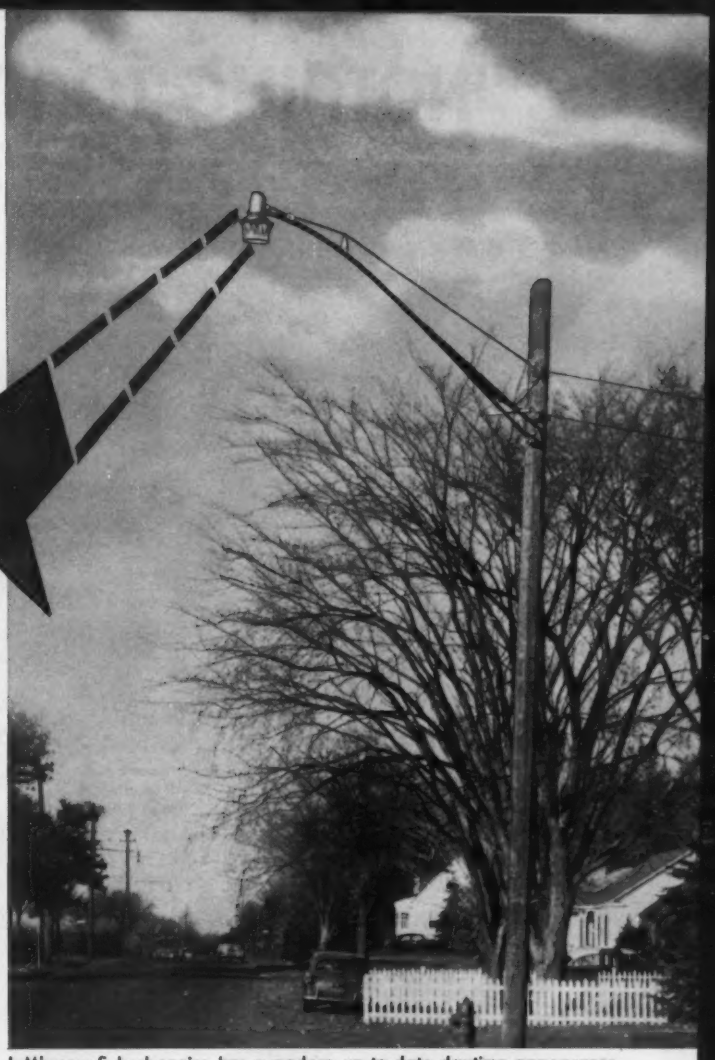
L-M overload indicators are available for mounting on transformers in service, with permanent magnet, or stainless steel wire to wrap around tank. On new L-M Round-Wound transformers, indicator is attached to a bracket permanently welded to the transformer tank. Ask the L-M Field Engineer for bulletins and complete information. Or write Line Material Company, Protective Equipment Division, Milwaukee 1, Wis.

272-R2

LINE MATERIAL *Protective Equipment*
McGRAW-EDISON COMPANY



Aluminum reflector can be latched directly to a standard NEMA head. Since the Suburbanaire is open at the bottom, the refractor does not need to be removed for relamping.



L-M's new Suburbanaire has a modern, up-to-date daytime appearance.

How L-M's Suburbanaire Improves Residential Lighting, Cuts Maintenance

L-M's new open-refractor Suburbanaire is an outstanding improvement in residential area luminaires. The open glassware provides for excellent cooling, larger lamps, and easy re-lamping. In addition, the Suburbanaire has a pleasing daytime appearance.

The Holophane® refractor glassware is available in type I, standard type II, type II 4-way offset, type III and type V light patterns. The unit offers greatly improved lighting over open luminaires often used for neighborhood streets.

Check These Outstanding Features

L-M's Suburbanaire Is More Efficient—

- Specially designed for long life, low wattage, and clear and color improved mercury vapor lamps including the new 100 watt (3300 lumens) and 175 watt (6800 lumens). Accommodates incandescent lamps up through 6000 lumens. Integrally mounted head and ballast assembly available for use with HG lamps.
- Provides more light at higher angles, making it adaptable to wider spacings which are typical in residential areas.
- Glare is at a minimum, even with high beam candlepower at a high angle, because of the large glass area, which provides a beacon effect with large light source. The light is developed from the entire refractor, not just from the area next to the reflector.
- Has high utilization of light output and improved efficiency.

L-M's Suburbanaire Cuts Maintenance Costs—

- Eliminates the problem of trapped dirt and condensation which collect in enclosed units.
- Relamping can be done without removing glassware. In many cases it can be done from the ground with a lamp stick.
- Alzak® aluminum reflector is latched for easy attachment to standard NEMA head. V-band permits field replacement of glassware when necessary.

Ask the L-M Field Engineer or Street Lighting Engineer for more information on features of L-M's Suburbanaire luminaire. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

LM®

LINE MATERIAL

McGRAW-EDISON COMPANY

Street Lighting

267-B

When ordering lighting equipment, protect yourself. Insist on quality products that meet the exacting requirements of EEI-NEMA standards (Edison Electric Institute and National Electrical Manufacturers Assn.)

"NOTHING TO IT!... Putting Up the

CARL HAWKINSON
Superintendent
Edwards Construction
Company
Geneseo, Illinois

"Nothing to it," says "Swede" Hawkinson. "First, slip the aluminum housing over the 2-inch support member and turn the housing *upside down*. Easy going—you're on top of the job, and in good working position—not underneath, working up like you are on other units."

"Hook up the primary. Terminals have tin-plated pressure-pad connectors to speed up the installation. The reflector assembly mounts on the housing with just three cotter-type hinge pins. Now, flip the reflector open to connect the leads. And see how the friction-type connectors save time."

LM®

LINE MATERIAL

A McGRAW ELEC

New L-M Fluorescent Luminaire Is Easy!"

That's the word from Carl "Swede" Hawkinson. "Nothing to it . . . one man can do the job. All you need is a screwdriver, a crescent wrench, and a level."

For a fact, the new L-M fluorescent luminaire is *remarkably* easy to install. You will understand why, as you study the photographs and explanation by "Swede" Hawkinson, competent and well-liked superintendent of the Edwards Construction Company, Geneseo, Illinois.

And bear in mind—this easy-to-install design by L-M offers *many* exclusive engineering advantages. In addition, L-M's new fluorescent luminaires present a *new look* in street-lighting equipment. They are styled for handsome appearance, correct light distribution, and a lifetime of efficient, economical operation.

Outstanding Features of L-M's New 1957-Style Fluorescent Luminaire

Shipping: Unit comes in two separate packages to make it easy to handle. The housing is in one package; globe and reflector assembly are in the other.

Housing: One-piece aluminum housing with reinforcing ribs provides strong, rigid mounting. Aluminum housing also provides excellent heat dissipation. Neoprene gaskets seal globe to housing and support entry, provide weatherproof construction.

Ballasts: Ballasts are mounted directly to flat inner surface of aluminum housing. This allows maximum heat dissipation during operation.

Ballast leads have friction-type terminals. Wiring is completed quickly and easily without tools.

4-lamp units have two ballasts, with one lamp from each side paired to each ballast.

Reflector: Two-piece reflector has separate, efficient reflecting surface for each lamp. Assembly is hinged and retained by spring-type latches to provide easy access to input terminals, ballasts, internal wiring, and mounting clamps.

Opening or removal of reflector assembly is accomplished without removal of lamps from their sockets.

Lamps: Only unit available today designed to take both present and future very high output (VHO) fluorescent lamps.

Globe: One-piece Plexiglas® globe is strong, virtually free from strain. Unit is latched and hinged to open from either side to provide easy accessibility for installation, wiring, cleaning, or relamping. "Breather" holes are provided in bottom of globe. Holes are covered with fiber glass filters to keep out dust and insects.

Wiring: Input terminals accommodate wire up to No. 4 stranded. They are tin-plated for use with either copper or aluminum conductor. Input circuit is arranged for operation on either 2- or 3-wire system.

Get Complete Information

Ask your L-M Field Engineer or Street Lighting Engineer for more complete information. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

Shallow-type luminaire

Shallow type is available in 4- and 6-foot lengths to accommodate 2 or 4 lamps. The deep style shown in photos below is also available in 4- and 6-foot lengths. For other outdoor lighting applications, such as parking lots, store-front lighting, etc., other styles are available. L-M Street Lighting Engineers will cooperate with you in designing the best system for your area.

"Next, turn the whole assembly 180° to normal position. Level and tighten up two interior clamping screws, and lock the reflector assembly in place with three twist-lock hasps. The two-piece reflector has separate reflecting surfaces for each lamp."

"All right! Now you put in the four fluorescent lamps, swing the globe assembly up into latched position, and the unit is ready to be fired up. The whole installation can be done in a matter of minutes. *Nothing to it!* . . . Putting up the L-M Fluorescent Luminaire is *easy!*"

Street Lighting

Elliott Construction Company
cuts handling costs . . .
eliminates repair charges
with new

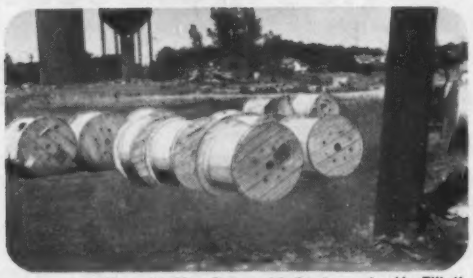
REYNOLDS NON-RETURNABLE REELS

- No reel deposit
- No empty reel gathering
- No reel storage
- No reel inventory
- No reel return shipments
- No reel repair charges

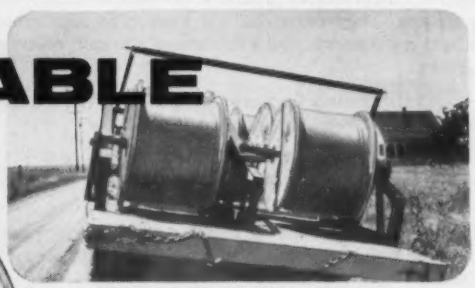
"Reynolds Non-Returnable Reels not only eliminate handling costs but also the red tape and nuisance involved in returning standard reels," says the Elliott Construction Company of Omaha, Nebraska. "We also don't have to worry about repair charges to the reels during stringing operations, and we have eliminated the time and costs of subsequent damage claims against carriers on the return trip."

These Non-Returnable Wooden Reels are not "junkers." They hold the same amount of cable as standard reels (bare conductor up through 4/0 ACSR); are lighter and easier to handle; withstand shipping to any part of the country; save you time and money. For details contact your nearest Reynolds Office, your Reynolds Electrical Distributor or write *Reynolds Metals Company, P.O. Box 1800-EL, Louisville 1, Kentucky.*

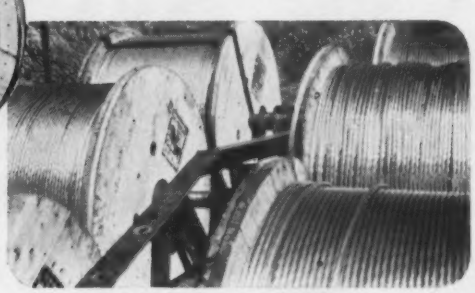
See "CIRCUS BOY", Reynolds dramatic series, Sundays on NBC-TV



1. Reynolds Non-Returnable Reels received by Elliott. Part of protective packing removed.



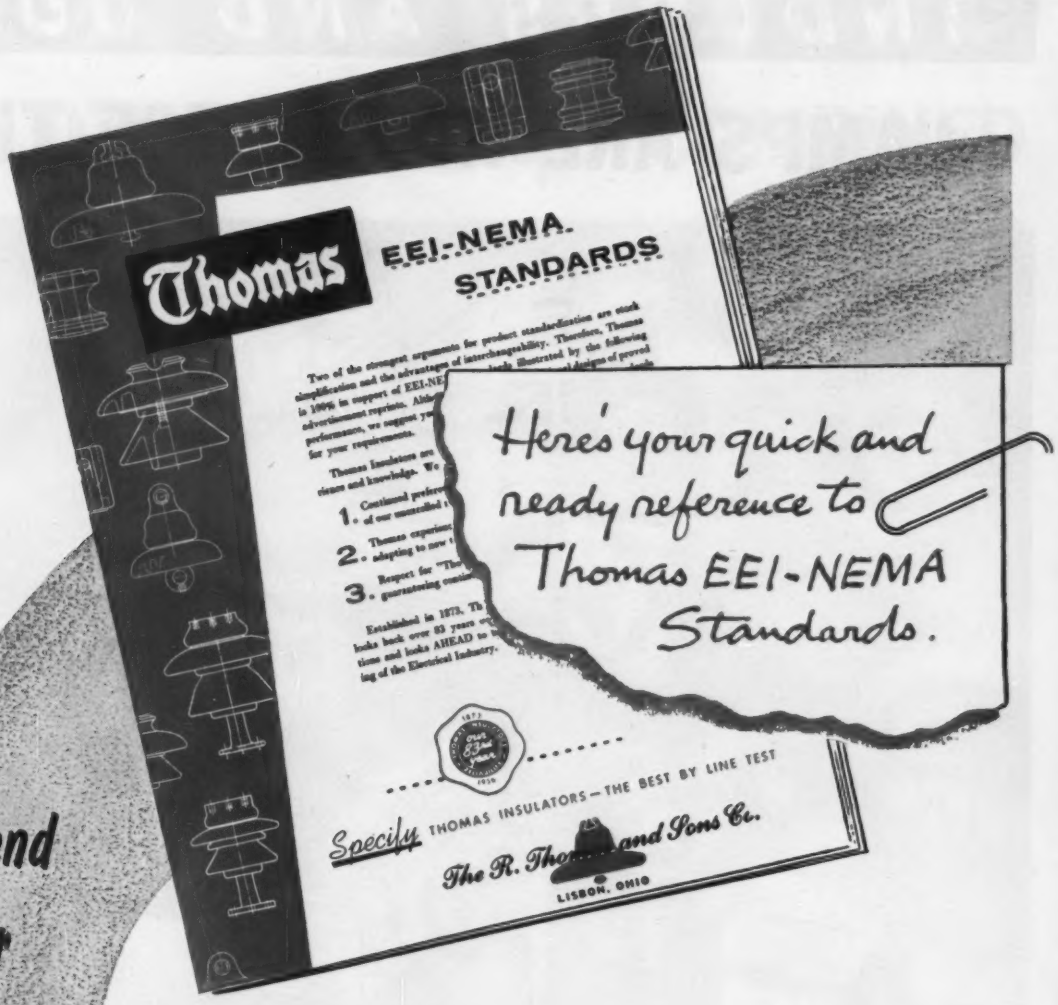
2. Reels being trucked by Elliott to job site.



3. Close-up of reels on truck.

4. Stringing operations in progress.

5. Reynolds reels in foreground ready for junking. Note good condition even after rugged use.


Thomas
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STANDARDS
Here's your quick and ready reference to Thomas EEI-NEMA Standards.
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The R. Thomas and Sons Co.
LISBON, OHIO

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The complete line of THOMAS EEI-NEMA PORCELAIN INSULATOR STANDARDS is illustrated and identified both by EEI-NEMA Class Numbers and by THOMAS Catalog Numbers. This new eight-page bulletin is the kind of ready reference you'll want at your fingertips — for convenience in selecting and ordering standard SUSPENSION, PIN-TYPE, APPARATUS, GUY-STRAIN or SPOOL Insulators for all applications.

THE R. THOMAS & SONS CO.
Lisbon, Ohio

Gentlemen: Please send my copy of the new THOMAS EEI-NEMA Standards Bulletin.

Name _____

Company _____

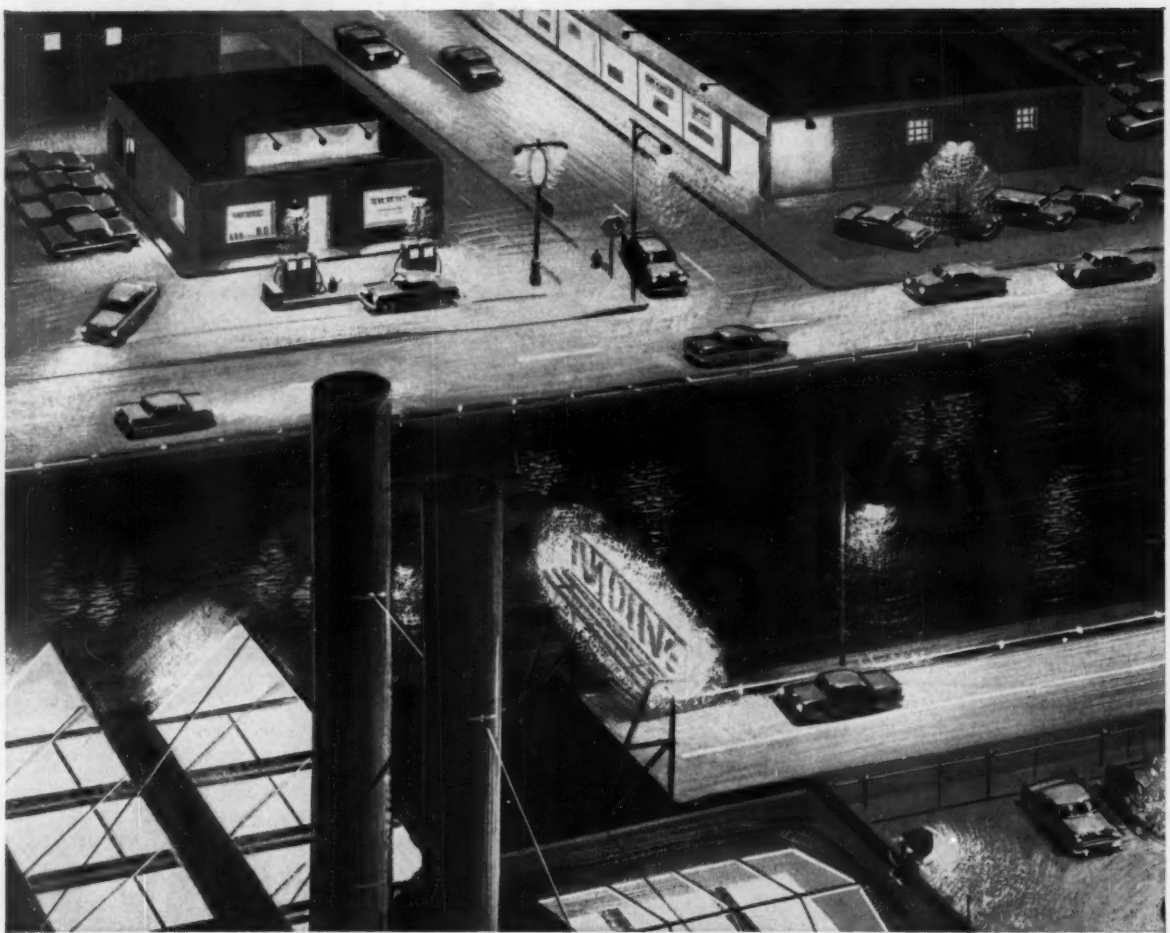
Street _____

City _____ Zone _____

State _____

INDOORS AND OUT

LAMPS ARE IN SERVICE THAN



They're Job-Tailored to give you the most mercury light for your money

From Westinghouse developments like those below, you can see how the built-in quality of Westinghouse Mercury Lamps gives *more light when new, more light throughout life, as well as guaranteed long life.*

- Thorium-Coated Electrodes provide HIGHER LIGHT OUTPUT
- Molybdenum Ribbon Seals assure GREATER DEPENDABILITY, LONGER LIFE
- Hi-Temp Life-Time Bases eliminate INSTALLATION AND SERVICE BREAKAGE
- *Weather Duty® construction with special "hard" glass. Outside installations can't be harmed by snow, sleet or rain even when lamps are installed without protective coverings . . . or inside by fumes, or dripping condensation.*

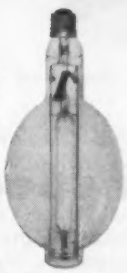
For recommendations for using the most complete line of mercury lighting—for the right kind of lamp for the job—call your nearest Westinghouse lamp supplier or write: *Westinghouse Lamp Division, Dept. R1, Bloomfield, N. J.*

B-H18: 700 W. Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general purposes, flood and street lighting. A Westinghouse exclusive.

YOU CAN BE SURE...IF IT'S Westinghouse

MORE WESTINGHOUSE MERCURY ALL OTHER BRANDS COMBINED

E-H1: 400 W. Mercury Lamp. Most widely used today. For interior and street lighting. **E-H1-Y:** Built-in clear yellow filter warns of road hazards.



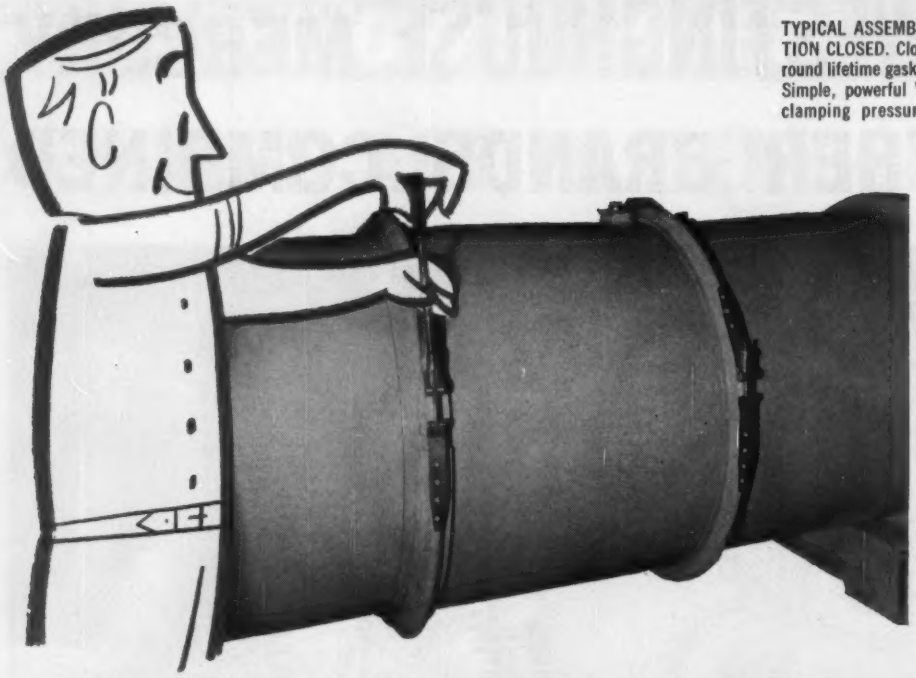
A-H12-WD; A-H15-WD:1,000W.Weather Duty Mercury Lamp. Recommended for all interior and exterior applications. Widely used for industrial high bay lighting. Weather proof for heavy duty service.

A-H1-WD: 400 W. Weather Duty Mercury Lamp. Recommended for general purposes, flood and street lighting. Weather proof for heavy duty service.

P-H1: 400 W. Semi-Reflector Mercury Lamp. Color-corrected Golden-White for all interior uses. Ideal for areas of high dust concentration.

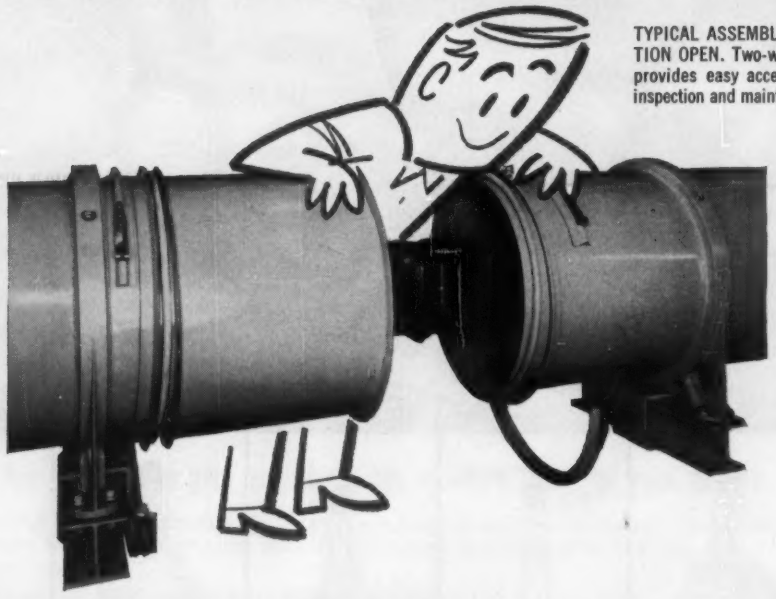
C-H12-WD; B-H15-WD:1,000W.Weather Duty Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general interior and floodlighting. Weather proof for heavy duty service.

J-H1: 400 W. Fluorescent-Mercury Lamp. Golden-White light is color-corrected for interior and street applications. **J-H1-Y:** Rich, yellow light to identify road hazards. Ideal substitute for sodium installations.



TYPICAL ASSEMBLY WITH TELESCOPING SECTION CLOSED. Closure requires only two 1-piece round lifetime gaskets—easy to place and remove. Simple, powerful V-clamp couplings distribute clamping pressure uniformly around the ring.

New design of I-T-E Isolated Phase Bus



TYPICAL ASSEMBLY WITH TELESCOPING SECTION OPEN. Two-way sliding telescoping section provides easy access to connectors—simplifies inspection and maintenance.

simplifies installation and inspection

All-welded aluminum basic assemblies—joined together with 2-way sliding telescoping sections—cut installation and inspection time. A V-clamp closure and a 1-piece round gasket in each telescoping section joint assure a permanently tight seal. This new design reduces gasketing 75%. In addition, it combines great strength and light weight with structural simplicity. And smooth inside surfaces prevent the accumulation of moisture.

Bulletins 10004-A and 10004-B describe I-T-E Isolated Phase Bus designs. For copies of these bulletins, write I-T-E Circuit Breaker Company, 19th and Hamilton Sts., Phila. 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY • SWITCHGEAR DIVISION

IN CANADA: EASTERN POWER DEVICES, LTD.

New exclusive KEARNEY 0-51 and 0-52 Tools

Out-perform all others!

Exclusive "Snap in-Snap out" Dies for faster installation of compression sleeves and fittings in widest size-range!

Another Kearney engineering first... and exclusive! New, low-cost 0-51 and 0-52 lever-action Tools make most distribution connections—install widest size range of compression sleeves and fittings. Extra speed and convenience because Kearney original "snap in-snap out" insert dies can be interchanged with two-finger ease! Lightweight, rugged construction. Write today for Bulletin 13.

Dies lock in place!

No tools needed. Self-aligning die halves "snap in-snap out." Utmost rigidity: each die part locks in rectangular seat by a shoulder and groove, is held in place by spring locking pins.

These connections can be made with 0-51 and 0-52 Tools:

SQUEEZONS—up to and including 4/0 ACSR, or stranded
L-TAPS—up to and including 2 ACSR, or stranded
T-TAPS—1/0 ACSR, or stranded
SERV-ENS—up to and including 1/0 ACSR, 4/0 stranded
SLEEVES—up to and including 4/0 stranded aluminum, 2/0 ACSR and stranded copper

Extra size range!

Fixed die in jaw nose installs Serv-Ens and L-Taps. Insert dies available to install sleeves and Squeezon fittings for most wire sizes used in distribution systems. Dies positioned close to fulcrum pins so minimum effort is needed on the tool handles. Wire cutter blades, also available, snap into same seat as the dies.

-337

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify KEARNEY PRODUCTS

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

The Mark of Quality

We don't pay extra for the extras we get with Penta-treated poles

Recently our company switched to Penta-treated poles. As division maintenance superintendent, I was anxious to find out what the crews thought about them. So I checked with Ned and his crew.

Ned said he and the boys like them because they're clean—easy to handle and easy to install. Then I mentioned that U.S. Government test records and service records of other utility companies show Penta gives outstanding long-life protection to poles. Keeps poles sound for years because it keeps rot and termites out. I told Ned it'd be a long time before he'd have to replace a Penta-treated pole.

Ned remarked that it sounded like Penta-treated poles are worth the extra money we pay for them. Actually, though, we don't pay a penny extra for the advantages we get with Penta-treated poles. They cost the same as poles treated with ordinary preservatives. THE DOW CHEMICAL COMPANY, Midland, Mich., Dept. PE 500B.

YOU CAN DEPEND ON DOW

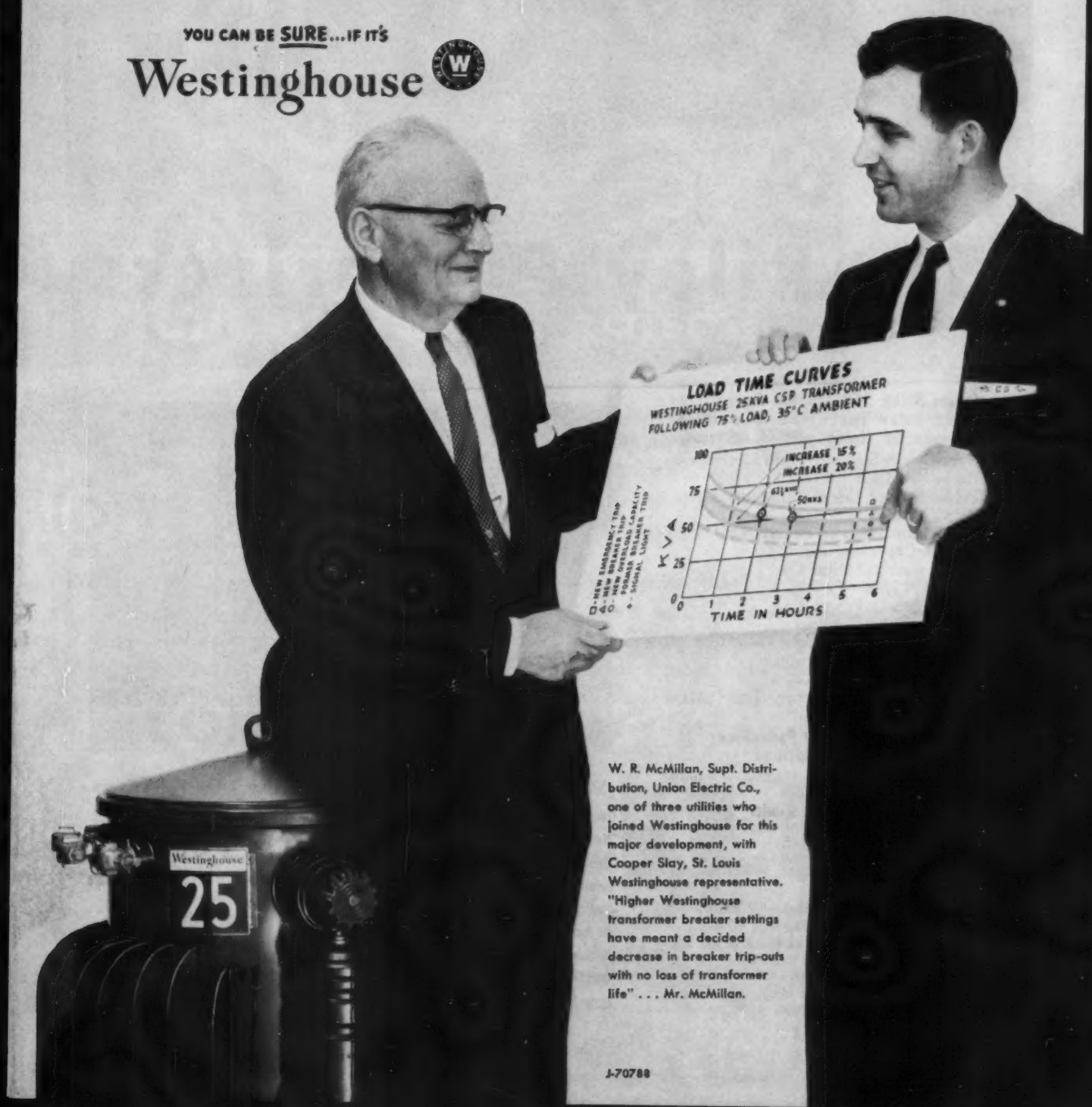
Your Westinghouse representative can prove . . .

20% INCREASED OVERLOAD CAPACITY

in all new Westinghouse distribution transformers *without sacrifice of service life!* The evidence is several thousand Westinghouse transformers with increased breaker settings put on Union Electric's lines, many since 1954, without a single burnout.

YOU CAN BE SURE...IF IT'S

Westinghouse



W. R. McMillan, Supt. Distribution, Union Electric Co., one of three utilities who joined Westinghouse for this major development, with Cooper Slay, St. Louis Westinghouse representative. "Higher Westinghouse transformer breaker settings have meant a decided decrease in breaker trip-outs with no loss of transformer life" . . . Mr. McMillan.

J-70788

Six Riley Pulverizers

Other Riley 550 Duplex Pulverizers have been installed in central stations of these public utilities.

Columbus & Southern Ohio Electric Co.
Picway — 4 Units

Public Service Co. of Colorado
Denver — 11 units

Iowa-Illinois Gas & Electric Co.
Davenport, Iowa — 1 unit

The Potomac Edison Co.
Albright, W. Va. — 3 units

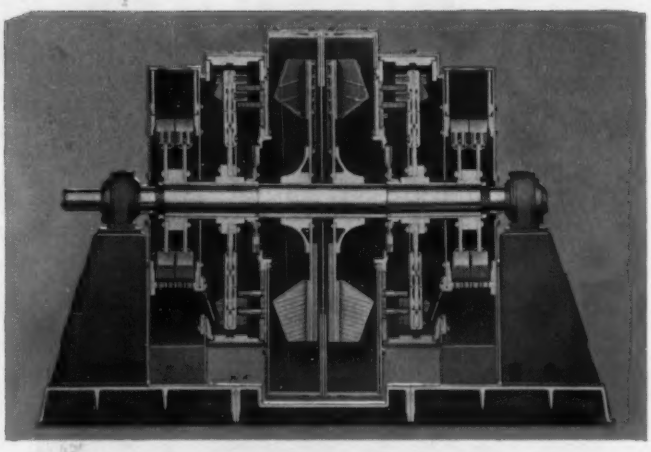
Monongahela Power Co.
Albright, W. Va. — 3 units

Delaware Power & Light Co.
Delaware City, Del. — 9 units

Iowa Public Service Co.
Waterloo, Iowa — 2 units

A few 550 and 450 Pulverizer Public Utility Installations

Utah Power & Light Co., Gadsby — 4 units
Northern States Power Co.,
Granite Falls, Minn. — 3 units
The Hartford Electric Light Co.,
Middletown, Ct. — 8 units
Iowa Electric Light and Power Co.,
Marshalltown — 6 units
Boone — 3 units
Taiwan Power Co., Formosa — 3 units
Upper Peninsula Generating Co.,
Marquette, Mich. — 2 units
Interstate Power Co.,
Lansing, Iowa — 2 units
Minnesota Power & Light Co.,
Duluth — 4 units



Some of the Outstanding Advantages of Riley Pulverizers

Tungsten carbide faced pulverizing parts
No metal to metal contact
Quiet, vibrationless operation
Small overall space
Low foundation cost
No loss of capacity with wet coal
Extreme load range
Insignificant Btu loss with rejections
Insignificant handling cost of rejections
Ease of maintenance and service
No adjustments required to maintain fineness
Low cost maintenance with high ash coals
Ability to use high primary air temperature with increase in efficiency
Minimum of lubricating difficulty
Ease of automatic regulation
No auxiliary air required for sealing
Minimum explosion and fire hazard
Rapid response to load change

will pulverize 115 tons of coal per hour at River Rouge Plant of Detroit Edison

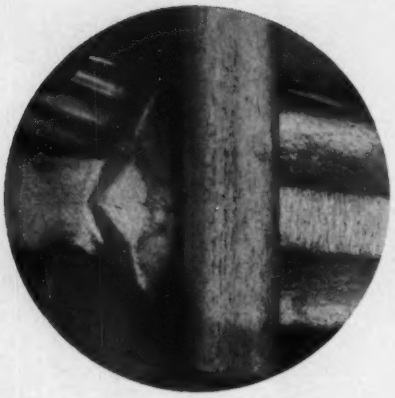
When the huge new 2,000,000 lbs/hr boiler at Detroit Edison's River Rouge Plant goes on the line these six Series E Riley Duplex Pulverizers, capable of pulverizing up to 138 tons of high fineness pulverized coal per hour, will provide more than enough capacity for the 114.5 tons per hour required by the huge boiler. Among their many desirable features will be quiet, vibrationless operation. Operating without metal-to-metal contact, pulverizing pegs, mounted on a huge rotating discs, will shatter coal particles against stationary pegs reducing coal by attrition to a high degree of fineness, and will sustain this fineness indefinitely. Tungsten carbide is applied to the facing of pegs to help reduce effects of erosion, and to prolong availability.

Riley is proud that the performance of its Pulverizer merited its selection for such an important role in Detroit Edison's expansion program, a program largely dedicated to the search for better and more efficient steam generation from coal.

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

RILEY
Stoker Corporation
WORCESTER, MASSACHUSETTS

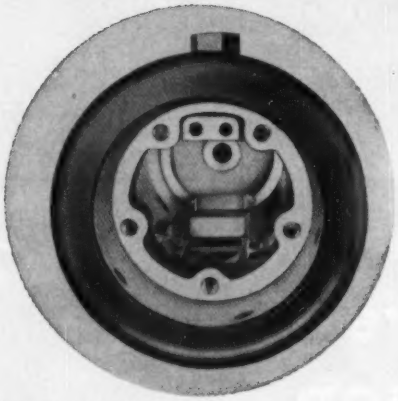
Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.



1. This maintains configuration and provides inhibitor protection!

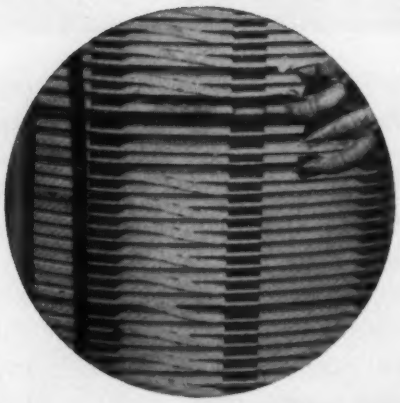
Ans.—Cover-all spacer, an integral part of Anderson's U-Bolt Connectors.

do you know what this is ?



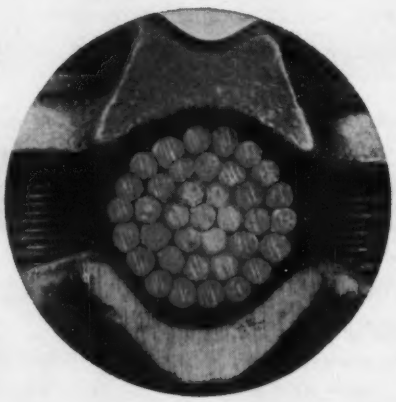
2. This breaks the current!

Ans.—A look inside the interrupter tube.



3. This carries the load!

Ans.—Coil assembly of oil immersed transformer.



4. Versatile application and increased range is its function!

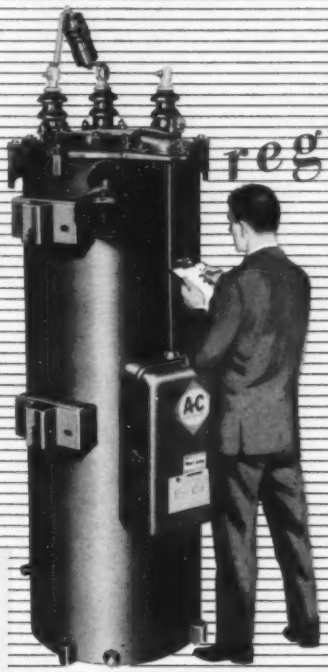
Ans.—Exclusive Anderson Electric Vers-A-Groove.

This is number one in a series of quizes designed to provide constructive diversion and to sharpen your wits.

What is your score?

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

key to low cost regulation



Single
Phase

DISTRIBUTION TYPE

Voltage Regulators

by

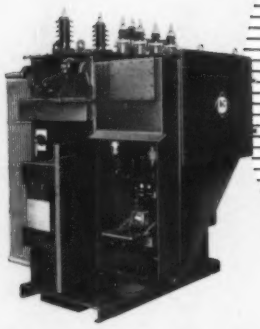
ALLIS-CHALMERS

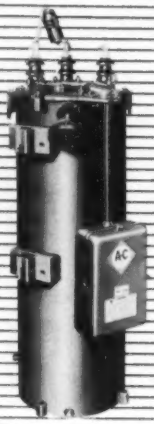
Originators of:

- ⅝% Step Regulators
- Unit-Construction
- Vari-Amp

A-5307

Allis-Chalmers regulators





Handy guide

How to use this chart

1. Select substation size. Example: 5000 kva, 219 amperes, 13,200 volts, self-cooled.

2. Determine percent regulation required. Few systems need a full ± 10% today. Remember that the *Vari-Amp* makes possible unique ranges, such as + 7½% — 10%, or + 5% — 10%, etc.

3. Select proper size regulating unit based either on current or kva, and range of regulation required. You have several choices. Example:

A. The usual way: Select LTC for your 5000-kva transformer. This provides ± 10% regulation.

B. Select regulator for ± 10% from adjacent table under first two columns which give voltage and kva. The size chosen would be Catalog No. 10-07.6-167 rated 167 kva, 7620 volts, 219 amperes at ± 10% regulation.

C. The money-saving way: Select regulator to fully utilize *Vari-Amp* capabilities. Figure regulation needs on basis of setting permanent taps of transformer up 5%.** It is then necessary to get only an additional 5% raise from the regulator. On maximum load the transformer raises voltage 5%, regulator 5% . . . a net raise of 10%.

On minimum load the transformer raises voltage 5%; regulator lowers voltage 10%, which gives a net result of — 5%. The regulator is allowed to go to — 10% because load current has dropped below the 10% current rating of regulator.

This requires the regulator to carry 5000 through kva or 219 amperes at + 5% *Vari-Amp* position.

Step 1: Enter chart at three-phase circuit voltage. Go down column to 13,200-volt bracket. **Step 2:** Go across chart and seek minimum size regulator for 5000 kva or greater. Note that a 167-kva unit providing 10% regulation will do the job. But let's see if a smaller one will work. If we go to 5% regulation column, three-phase circuit kva, there's a unit for 5486 kva . . . Catalog No. 10-07.6-114.3. This is the minimum size unit.

4. COMPARE PRICE

LTC on transformer with ± 10% regulation .	$14,551
3 Distribution regulators with ± 10% regulation	11,670
3 Distribution regulators providing + 10% — 5% regulation utilizing 5% tap on transformer	9,384
SAVING using *Vari-Amp* . . .	**$5,167**

** On some ratings alternate voltage can be used on low voltage winding instead of using permanent taps.

KVA Per Each Regulator at ± 10% Regulation	Step 1 Circuit Voltage 1φ	Circuit Voltage 3φ	CIRCUIT KVA AND CURRENT 10% Regulation Amp Per Regulator	Circuit KVA 1φ	Circuit KVA 3φ
25	2500	4330Y	100	250	750
37.5	2500	4330Y	150	375	1125
50	2500	4330Y	200	500	1500
75	2500	4330Y	300	750	2250
100	2500	4330Y	400	1000	3000
25	2500	2500 Open △	100	250	433
37.5	2500	2500 Open △	150	375	649.5
50	2500	2500 Open △	200	500	866
75	2500	2500 Open △	300	750	1299
100	2500	2500 Open △	400	1000	1732
25	5000	8660Y	50	250	750
50	5000	8660Y	100	500	1500
75	5000	8660Y	150	750	2250
100	5000	8660Y	200	1000	3000
25	5000	5000 Open △	50	250	433
50	5000	5000 Open △	100	500	866
75	5000	5000 Open △	150	750	1299
100	5000	5000 Open △	200	1000	1732
11.4	7620	13200Y	15	114	342
19.1	7620	13200Y	25	191	573
38.1	7620	13200Y	50	381	1143
57.2	7620	13200Y	75	572	1716
76.2	7620	13200Y	100	762	2286
114.3	7620	13200Y	150	1143	3429
167	7620	13200Y	219	1670	5000
34.5	13800	13800 △	25	345	598
69	13800	13800 △	50	690	1195
34.5	13800	13800 Open △	25	345	598
69	13800	13800 Open △	50	690	1195
36	14400	24940 GRY	25	360	1080
72	14400	24940 GRY	50	720	2160
144	14400	24940 GRY	100	1440	4320

Step 2

ALLIS-CHALMERS

with *Vari-Amp*

cost 25-30% less than LTC*

to low cost voltage regulation

*Transformers with load tap changers.

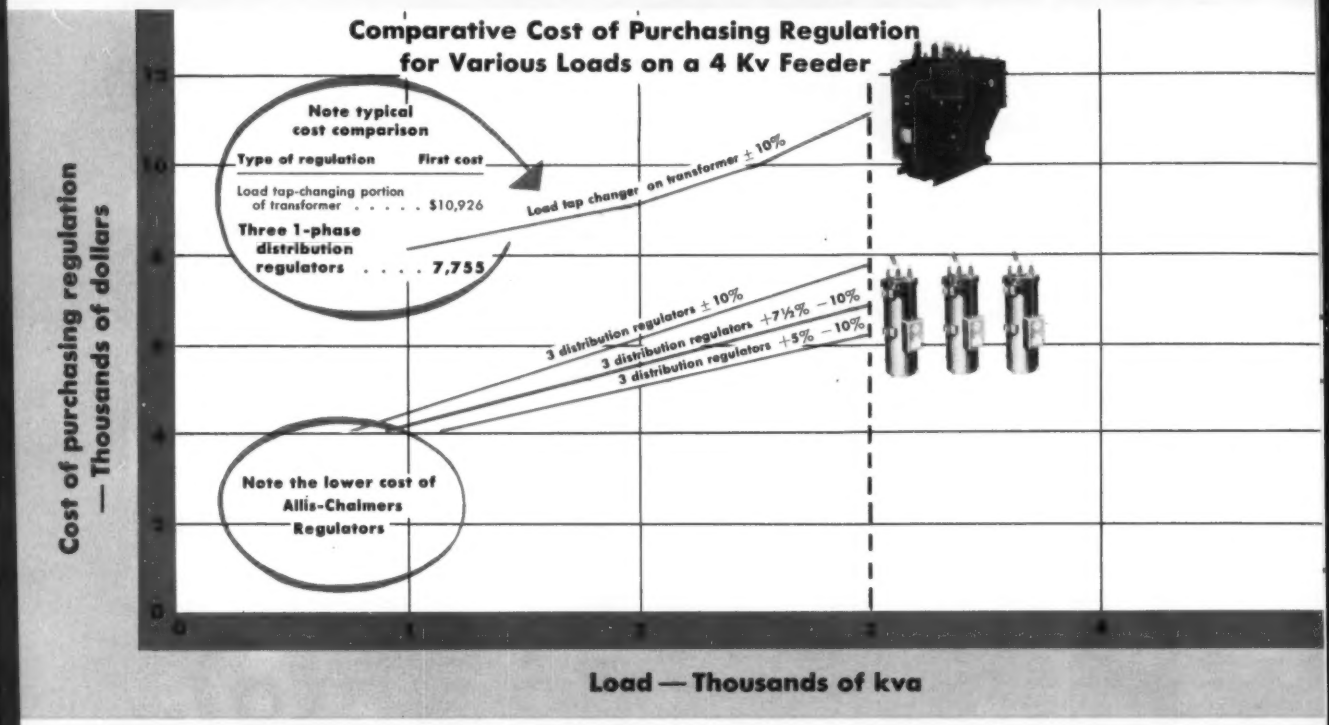
USE CHART TO FIND YOUR SAVINGS WITH *VARI-AMP*

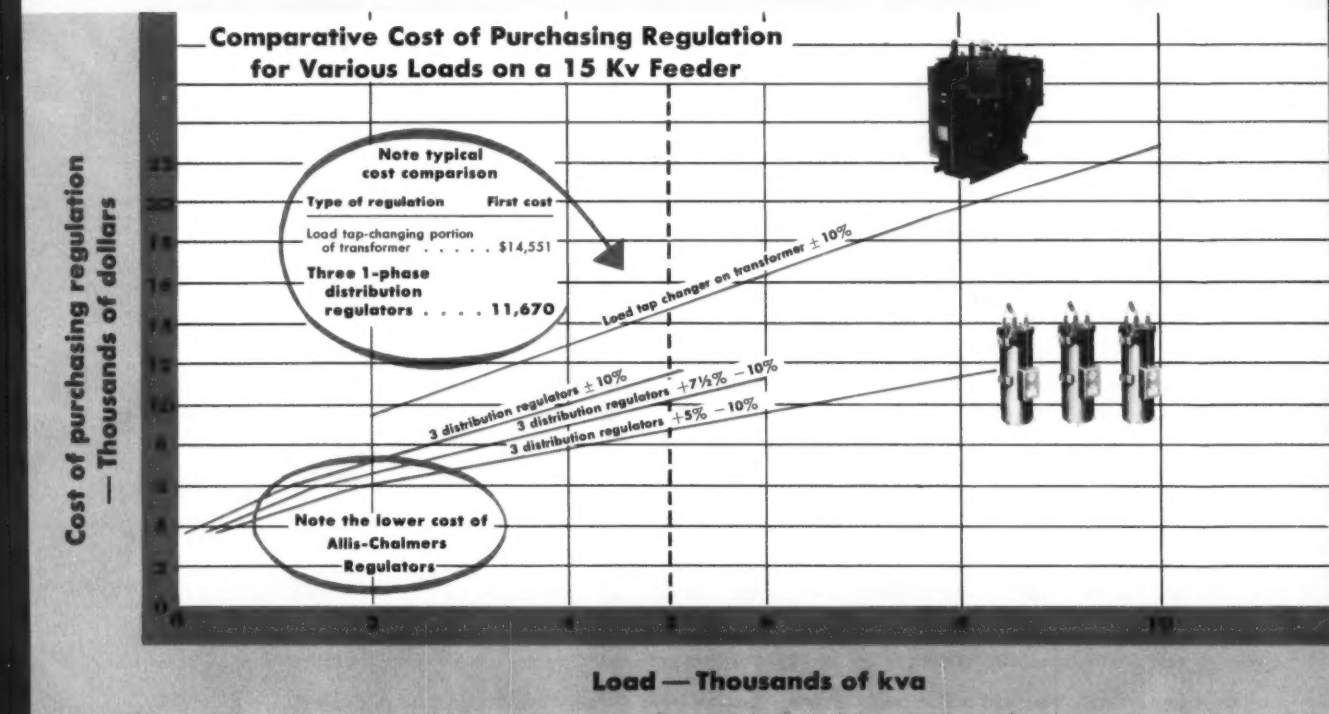
CIRCUIT KVA AND CURRENT												Regulator Catalog Number	Net Price Each	
8¾% Regulation			7½% Regulation			6¼% Regulation			5% Regulation					
Amp Per Regulator	Circuit KVA		Amp Per Regulator	Circuit KVA		Amp Per Regulator	Circuit KVA		Amp Per Regulator	Circuit KVA			Eastern Zone	Western Zone
	1φ	3φ		1φ	3φ		1φ	3φ		1φ	3φ			
110	275	825	120	300	900	135	338	1013	160	400	1200	10-02.5-025.0	$1438	$1459
165	413	1238	180	450	1350	202.5	506	1519	240	600	1800	037.5	1603	1627
220	550	1650	240	600	1800	270	675	2025	320	800	2400	050.0	1768	1794
330	825	2475	360	900	2700	400	1000	3000	400	1000	3000	075.0	2250	2294
400	1000	3000	400	1000	3000	400	1000	3000	400	1000	3000	100.0	2585	2624
110	275	476	120	300	519	135	338	585	160	400	692	10-02.5-025.0	1438	1459
165	413	714	180	450	779	202.5	506	877	240	600	1039	037.5	1603	1627
220	550	952	240	600	1039	270	675	1169	320	800	1385	050.0	1768	1794
330	825	1429	360	900	1558	400	1000	1732	400	1000	1732	075.0	2250	2294
400	1000	1732	400	1000	1732	400	1000	1732	400	1000	1732	100.0	2585	2624
55	275	825	60	300	900	67.5	338	1013	80	400	1200	10-05.0-025.0	1582	1605
110	550	1650	120	600	1800	135	675	2025	160	800	2400	050.0	1912	1940
165	825	2475	180	900	2700	202.5	1013	3038	240	1200	3600	075.0	2352	2387
220	1100	3300	240	1200	3600	270	1350	4050	320	1600	4800	100.0	2696	2736
55	275	476	60	300	519	67.5	338	585	80	400	692	10-05.0-025.0	1582	1605
110	550	952	120	600	1039	135	675	1169	160	800	1385	050.0	1912	1940
165	825	1428	180	900	1559	202.5	1013	1753	240	1200	2078	075.0	2352	2387
220	1100	1905	240	1200	2078	270	1350	2338	320	1600	2771	100.0	2696	2736
16.5	126	378	18	137	411	20.25	154	462	24	183	549	10-07.6-011.4	1257	1276
27.5	210	630	30	229	688	33.75	258	774	40	306	917	019.1	1665	1690
55	419	1257	60	457	1372	67.5	514	1543	80	610	1829	038.1	1961	1990
82.5	629	1888	90	686	2059	101.25	772	2317	120	915	2746	057.2	2236	2269
110	838	2515	120	914	2743	135	1029	3086	160	1219	3658	076.2	2524	2562
165	1257	3772	180	1372	4115	202.5	1543	4629	240	1829	5486	114.3	3128	3175
240.9	1837	5511	262.8	2004	6012	295.65	2255	6764	350.4	2672	8016	167.0	3890	3948
27.5	380	657	30	414	717	33.75	466	806	40	552	956	10-13.8-034.5	1961	1990
55	759	1314	60	828	1434	67.5	932	1612	80	1104	1912	069.0	2524	2562
27.5	380	657	30	414	717	33.75	466	806	40	552	956	10-13.8-034.5	1961	1990
55	759	1314	60	828	1434	67.5	932	1612	80	1104	1912	069.0	2524	2562
27.5	396	1188	30	432	1296	33.75	486	1458	40	576	1728	10-14.4-036.0	3151	3198
55	792	2376	60	864	2592	67.5	972	2916	80	1152	3456	072.0	3399	3450
110	1584	4752	120	1728	5184	135	1944	5832	160	2304	6912	144.0	3709	3765

Vari-Amp control provides increased current capacity up to 160% at ±5% regulation—up to 400 amperes. Adjustment of regulating range can be made while regulator is in service.

Prices subject to change without notice

Charts Prove 25-30% Savings Using Regulators


Comparative Cost of Purchasing Regulation
for Various Loads on a 4 Kv Feeder
Cost of purchasing regulation
— Thousands of dollars
Note typical
cost comparison
Type of regulation
First cost
Load tap-changing portion
of transformer $10,926
Three 1-phase
distribution
regulators 7,755
Load tap changer on transformer ± 10%
3 distribution regulators ± 10%
3 distribution regulators +7½% −10%
3 distribution regulators +5% −10%
Note the lower cost of
Allis-Chalmers
Regulators
Load — Thousands of kva


Comparative Cost of Purchasing Regulation
for Various Loads on a 15 Kv Feeder
Cost of purchasing regulation
— Thousands of dollars
Note typical
cost comparison
Type of regulation
First cost
Load tap-changing portion
of transformer $14,551
Three 1-phase
distribution
regulators 11,670
Load tap changer on transformer ± 10%
3 distribution regulators ± 10%
3 distribution regulators +7½% −10%
3 distribution regulators +5% −10%
Note the lower cost of
Allis-Chalmers
Regulators
Load — Thousands of kva

- For further information call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

ALLIS-CHALMERS

SAME voltage rating

. . . ANY strength

When substation design calls for buses to withstand high fault currents, there's often considerable economy in use of insulators of high cantilever strengths. Availability of such insulators affords freedom in structure design, and reduces total number of insulators and points-of-support required.

In the illustration above, the insulators shown are, in order, a Lapp Standard Station Post, a Lapp High Strength Station Post, a Lapp Extra High-Strength Station Post, and a "special" Lapp Station Post of still higher strength. It's "special" only because it doesn't happen to be in the most recent catalog, and because it doesn't fit any previously-established formal strength standards. A customer needed 10,000 lb. cantilever strength in a 23-Kv switch and bus insulator. He got it—in a hurry. If you need an insulator of such characteristics, specify it as Lapp No. 41398. If you need switch-and-bus supports in any other strength rating, we can probably make them, too. The merit of the Lapp Station Post design is reflected in the ease of its stress analysis. The simplicity of the post structure, the uniform reliability of Lapp porcelain, and the certainty of externally-attached caps—instead of pins or inserts—all are such that it is routinely possible to design an insulator into an unexplored strength field, without risk of unknown variables.

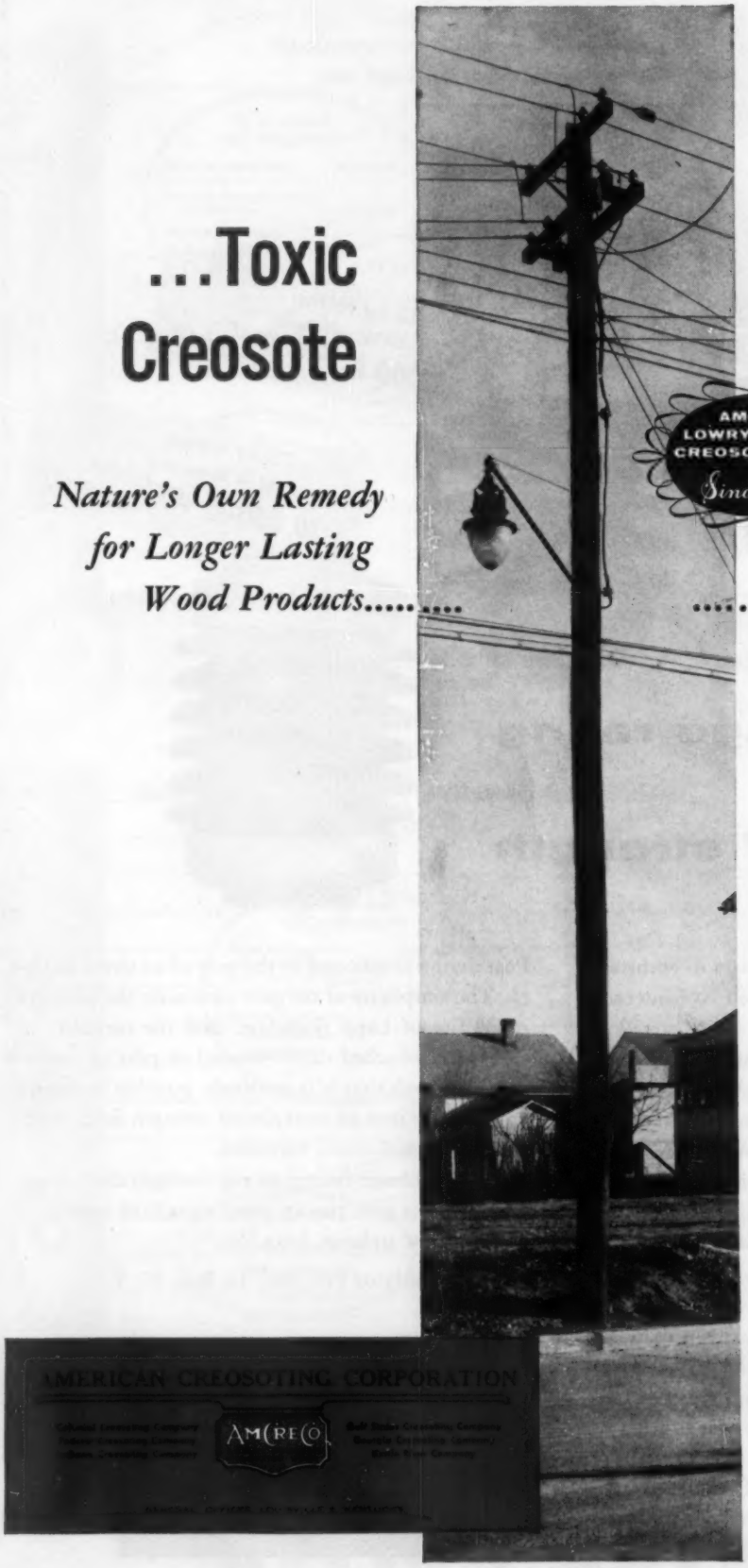
At any voltage rating, in any strength class, Lapp Station Posts give you an *extra* margin of operating security, low upkeep, long life.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

...Toxic Creosote

Nature's Own Remedy for Longer Lasting Wood Products.....



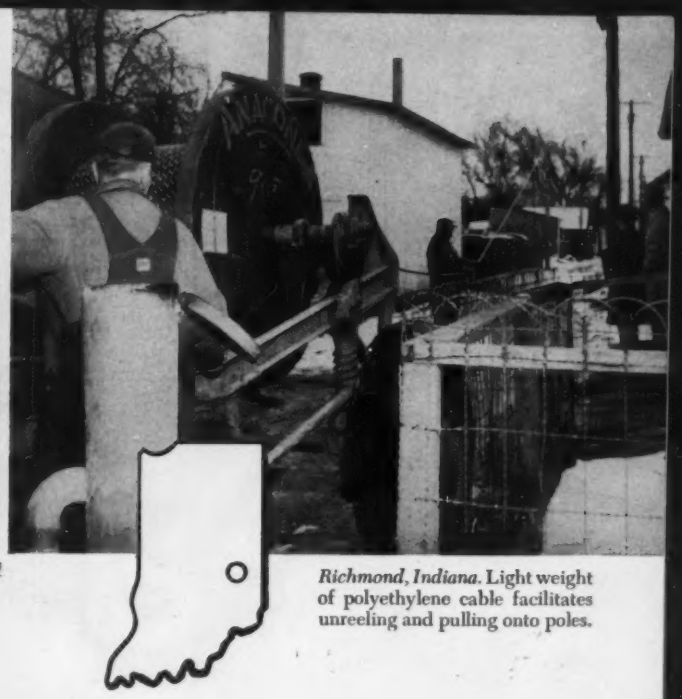
.....For over 50 years, creosote has reigned supreme as the number one wood preservative. That's because creosote, which is actually "dead oil of coal tar," contains over 100 ingredients that are highly toxic to fungi, borers and all natural enemies of wood. Creosote is not just a simple laboratory compound, but a highly complex substance formulized by "nature" millions of years ago.

But effective as creosote may be, it still has to be applied properly for maximum results. And that's where the American Creosoting Company enters the picture.

The American Creosoting Company invented and introduced the first practical commercial method of creosote treatment. That was over fifty years ago and they have been on the job ever since. Through continuous research and development, and the experience that comes only through years of service, Amcreco can guarantee you the best in treated wood products plus the service to go with it.

Amcreco's treatment plants are conveniently located for prompt domestic or export shipment. Write your nearby Amcreco sales office for estimates or quotations on your future supplies of treated poles, cross arms, conduit and other construction wood products.

Scott County, Virginia. Rugged terrain requires lightweight polyethylene-insulated aerial cable.



Richmond, Indiana. Light weight of polyethylene cable facilitates unreeling and pulling onto poles.

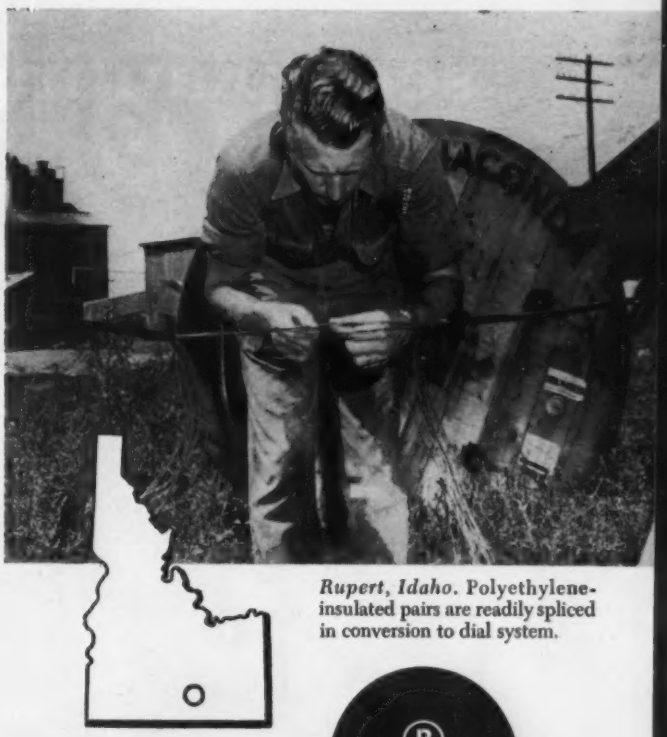
More telephone installations show

why polyethylene is gaining ground

Every user of wire and cable can profit from the years of experience that the telephone industry has now accumulated in the use of BAKELITE Brand Polyethylene. Across the country, exposed to varied climatic conditions and problems of terrain, polyethylene has demonstrated its superiority over older insulating and jacketing materials.

The light weight and toughness of BAKELITE Polyethylene have brought faster, less costly installation with longer spans, fewer poles. Its moisture resistance has drastically reduced weather problems. Its dielectric strength far exceeds telephone requirements.

BAKELITE Polyethylene meets REA requirements for plastic-insulated telephone cable, IPCEA specifications for power cable, ASA standards for weatherproof wire, ASTM D1238-52T Type II dielectric materials, and IMSA specifications for fire alarm and signal control cable. For more information, write Dept. VG-53.

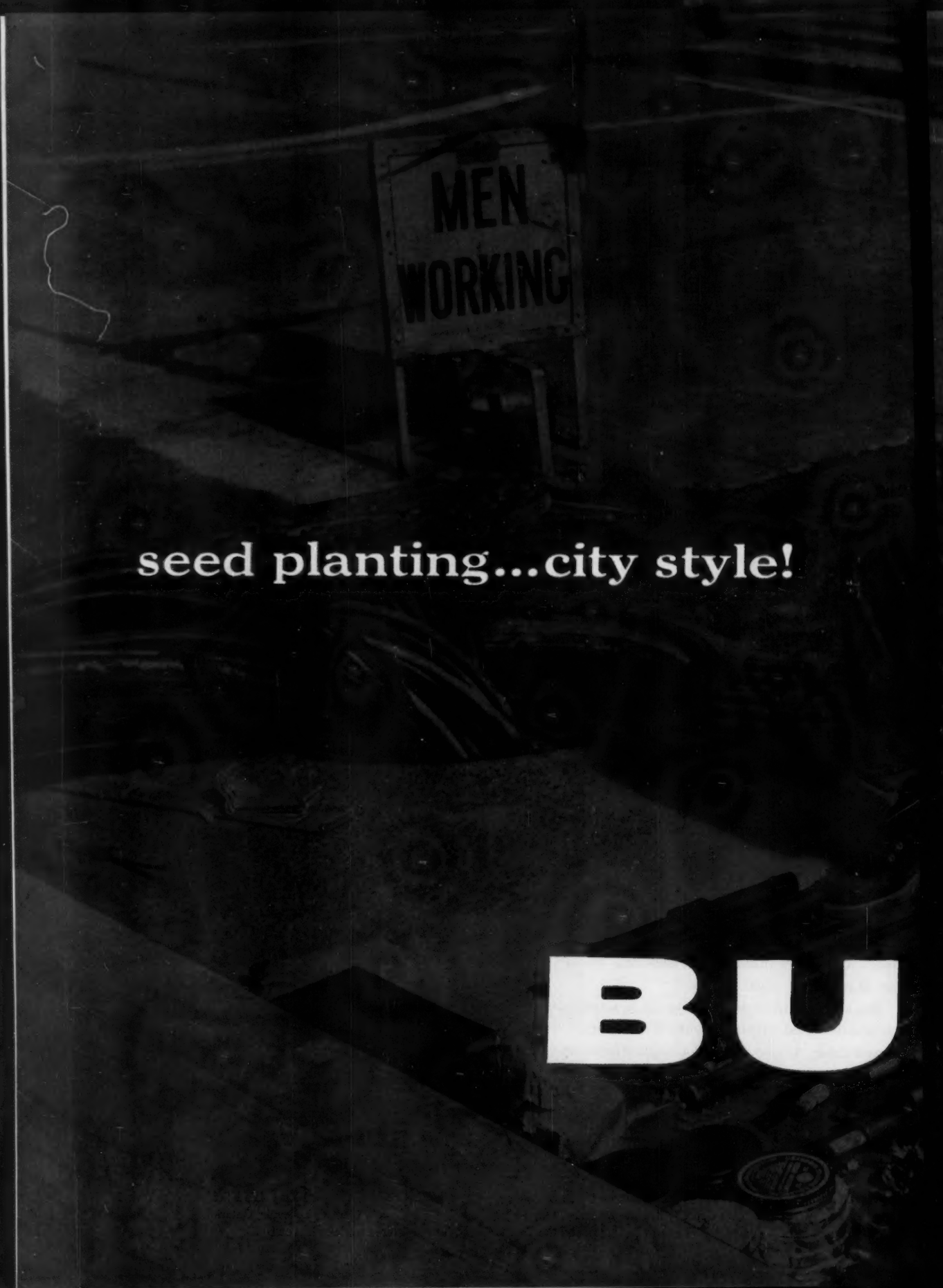


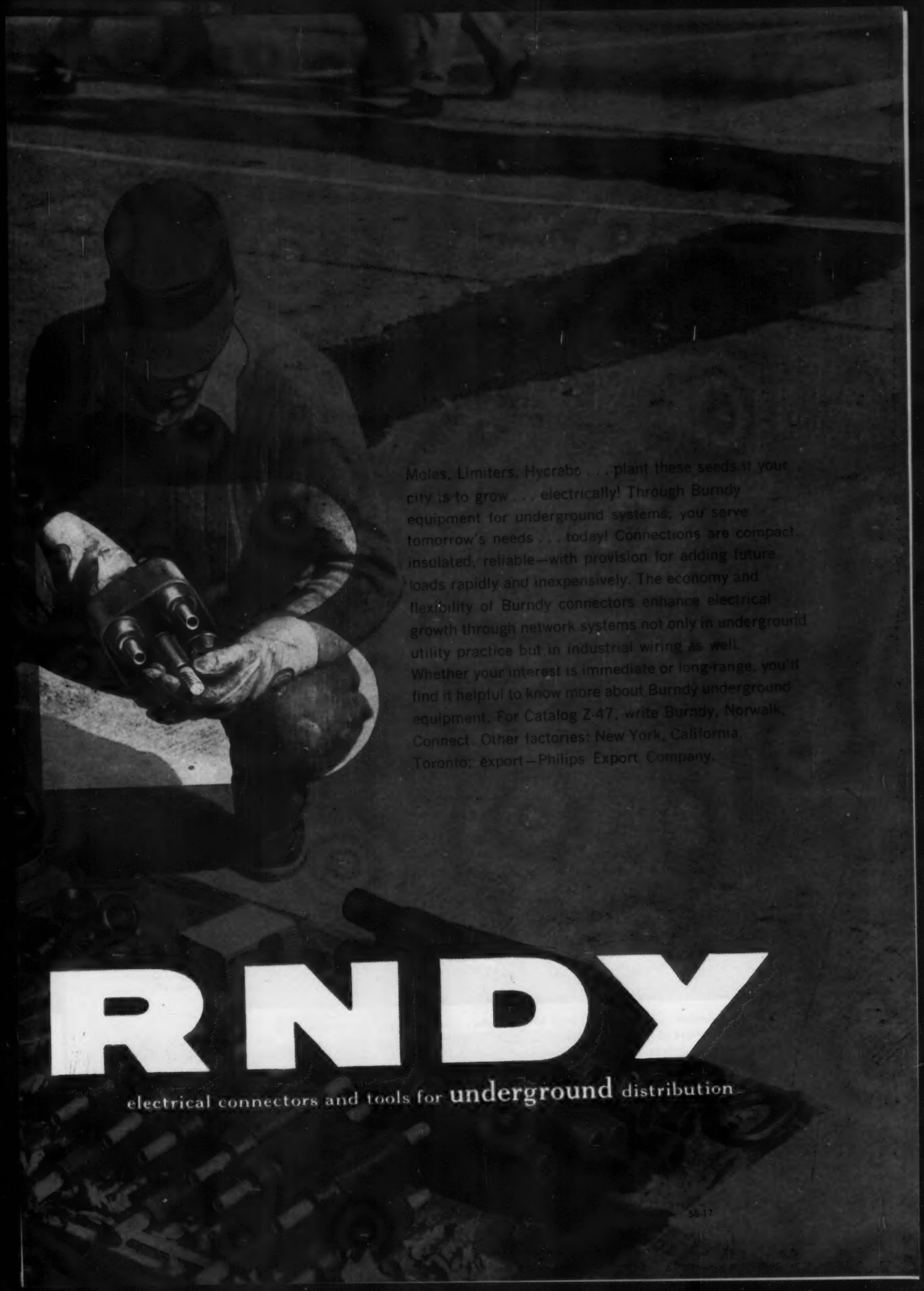
Rupert, Idaho. Polyethylene-insulated pairs are readily spliced in conversion to dial system.

Illustrations show cable produced by Anaconda Wire & Cable Co., New York, N. Y.

BAKELITE
BRAND
Polyethylene Plastic

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC.


MEN
WORKING
seed planting...city style!
BU


Moles. Limiters. Hycrabs . . . plant these seeds if your city is to grow . . . electrically! Through Burndy equipment for underground systems, you serve tomorrow's needs . . . today! Connections are compact, insulated, reliable—with provision for adding future loads rapidly and inexpensively. The economy and flexibility of Burndy connectors enhance electrical growth through network systems not only in underground utility practice but in industrial wiring as well. Whether your interest is immediate or long-range, you'll find it helpful to know more about Burndy underground equipment. For Catalog Z-47, write Burndy, Norwalk, Connect. Other factories: New York, California, Toronto; export—Philips Export Company.
RNDY
electrical connectors and tools for underground distribution
56-17

Proven Leadership*

*IN 1956 . . . MORE UTILITIES BOUGHT

POWERS American

SERVICE BODIES
THAN ANY OTHER MAKE

HERE'S WHY! Powers-American builds *fine* service bodies . . . and *builds them to last.*

Powers-American can furnish the *just right* body for any service job—standardized for greatest economy . . . modified-standard, to fit individual job needs . . . custom-made, to meet specific operating requirements.

Whether you have one truck or the largest fleet . . . you'll find it worthwhile to get details from Powers-American next time you need service bodies for your operation.

SERIES 350 Bodies have an under-floor winch, a fold-over derrick, and an extension ladder. Compartments are equipped to carry a variety of service tools, parts, and materials.

SERIES 25 Bodies are available in standard models equipped specifically for telephone, electric, gas, or water meter installation and service.

SERIES 44L Bodies have same construction features as Series 44 Bodies described above . . . plus a shelf-equipped superstructure, available with or without roof.

SERIES 450 Bodies, designed for light duty construction and maintenance work, are equipped with a revolving aerial ladder, an underfloor winch, and an easy-to-use derrick.

SERIES 44 Bodies . . . in 75", 90", and 104" lengths . . . are designed for service work in any phase of the utility industry. Equipped with bins, racks, material hooks, and adjustable shelves. Available with optional items to fit individual work needs.

Descriptive literature and price information is yours for the asking

UTILITIES EXPECT MORE FROM POWERS American

McCABE-POWERS
AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO. 625 CEDAR ST. • BERKELEY 10, CALIF.

You can see why linemen prefer

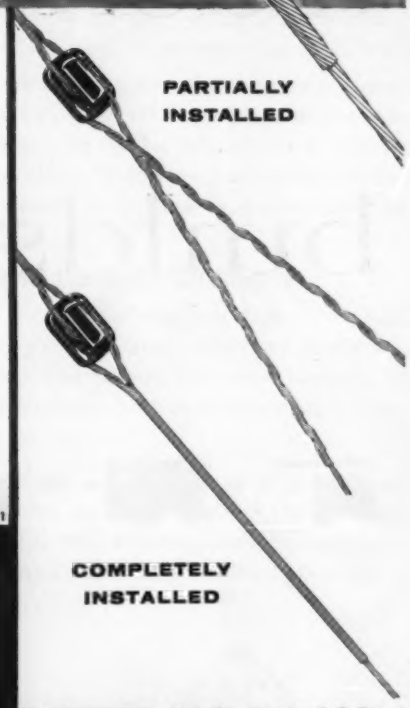
GUY-GRIP Dead-Ends

Linemen are enthusiastic!

PLP GUY-GRIP dead-ends are the easiest, fastest and safest method yet devised for dead-ending strand.

Installation is easy because it takes just one unit, no moveable parts, no bolts or clamps to tighten. It's fast. All you do is hand-wrap the dead-end legs around the strand.

And it's safe. You can see at a glance that the installation is completed and thus secure. Linemen make better time, take pride in their work. Dept. No. PR1C



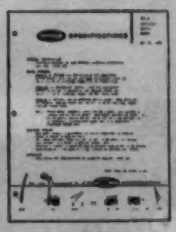
PX-81

PREFORMED LINE PRODUCTS CO.

5349 ST. CLAIR AVE. • CLEVELAND 3, OHIO

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

only Holan uses high-tensile steel in all of the utility truck bodies it builds



WRITE FOR DATA SHEET THAT TELLS YOU HOW HIGH-TENSILE STEEL CUTS DOWN WEIGHT AS MUCH AS 25%, INCREASES RUST RESISTANCE AND PROTECTS PAINT JOBS.

J. H. HOLAN CORPORATION

4100 WEST 150TH STREET CLEVELAND 11, OHIO

OTHER PLANTS: GRIFFIN, GA.; PHOENIX, ARIZ.; BRANTFORD, ONTARIO

DERRICKS • LADDERS • TOWERS • DIGGERS • JACKS

ONE-TON TEST

proves physical strength of "Integrated" field coils in ALLIS-CHALMERS MOTORS

It's not likely a field coil of a motor would ever be punished this way. But tests like this illustrate the inherent ability of Allis-Chalmers "INTEGRATED" FIELD COILS to withstand the stresses created by the most severe loading conditions of a motor.

Available only on Allis-Chalmers Motors

"Integrated" field coils, available only on Allis-Chalmers motors, are enveloped in oriented glass fibers and heat-stabilized resins. These are securely locked to poles to resist mechanical force. High dimensional stability and tensile strength characteristics assure long life under the toughest of operating conditions.

Coils are surface sealed against atmospheric contaminants. In addition, the coefficient of expansion of insulation is similar to that of copper. Heat transfer qualities are excellent. "Integrated" coil structures can withstand the most severe thermal cycling found in normal operation.

Exclusive Allis-Chalmers

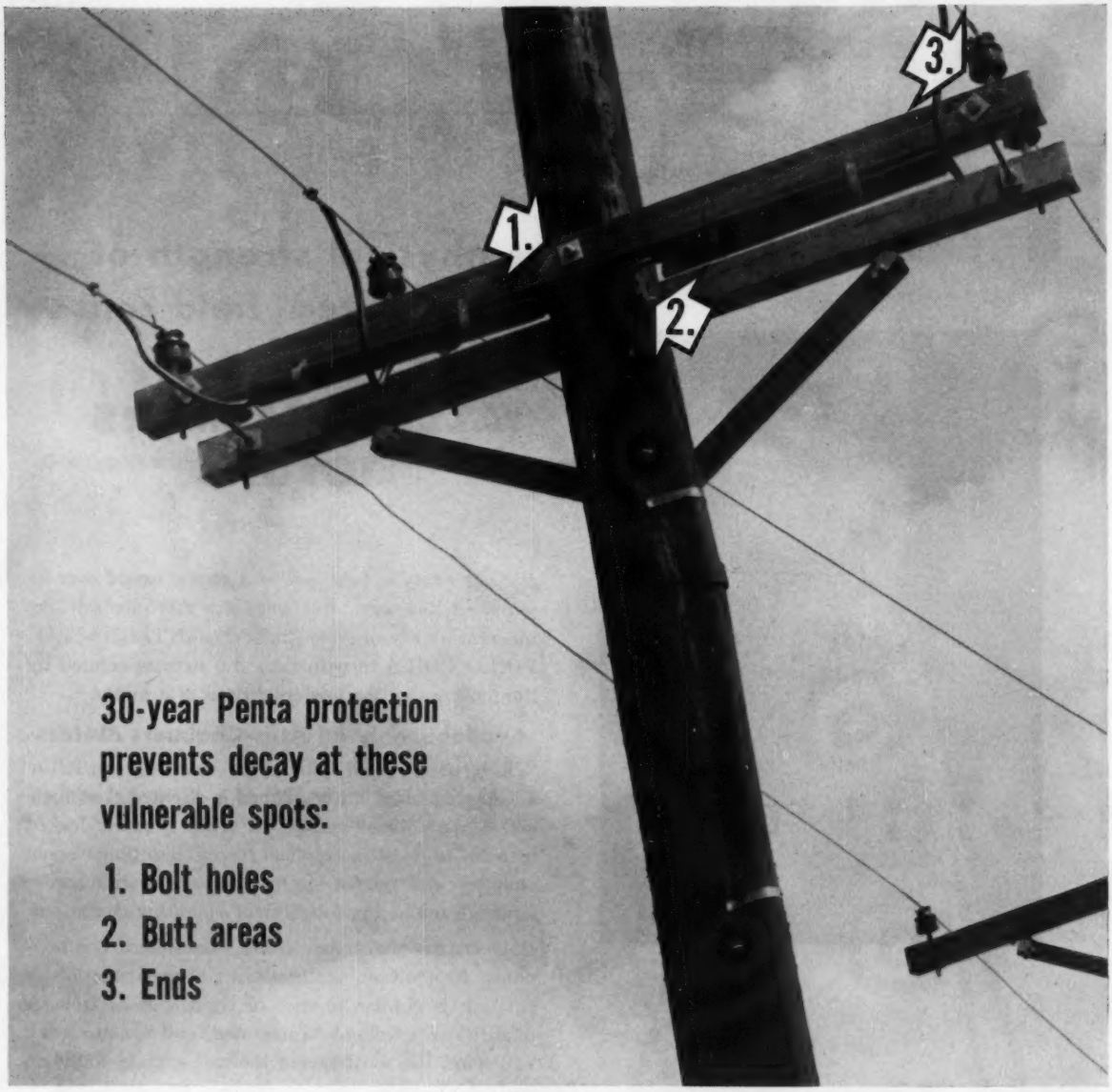
"Double-protection," combining new "Integrated" field coils with *Silco-Flex* all-silicone stator coil insulation, is available for rotating and stationary elements of large ac or dc machines with operating temperatures through Class B range.

For the whole story of Allis-Chalmers motors, contact your local A-C representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Silco-Flex is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5276



30-year Penta protection prevents decay at these vulnerable spots:

1. Bolt holes
2. Butt areas
3. Ends

Cut replacement costs...make your whole pole plant last longer with clean Penta-treated crossarms!

Doesn't it make good sense, in view of rising crossarm installation and replacement costs, to use Penta-treated crossarms *as well as Penta-treated poles.* By using Penta-treated crossarms, your whole pole plant is assured maximum in-service life and freedom from periodic, costly maintenance and replacement.

Penta-treated crossarms last 30 years and longer. They're immunized against decay—especially where it is most likely to occur—at bolt holes and where arm butts pole. Penta also holds end-fraying in check.

Easy to handle. Penta-treated crossarms . . . and poles . . . are clean, easy to handle. Won't "burn" hands, stain clothing. Installations go up fast.

Specify Penta! Your near-by treating plant is equipped to supply *all* your Penta-treated forest products needs for crossarms, poles, transformer platforms, braces, planking. Write us for your list of treating plants and your informative copy of "Poles and Crossarms."

Organic Chemicals Division
MONSANTO CHEMICAL COMPANY
Dept. PI-13, St. Louis 1, Missouri

MONSANTO

WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU

GENERAL CABLE'S HIGH QUALITY CONTROL CABLE with

To preserve the superior physical characteristics inherent in black neoprene, General Cable applies a colored synthetic rubber base coating supplemented, where necessary, by spiral striping over the black neoprene jacket of individual conductors.

This new, carefully developed method of color coding the individual conductors of multiple conductor cable results in superior quality, brighter colors and an extra tough coating for permanence.

Station, Traffic, Elevator and Railway control cables are color coded in accordance with IPCEA Standard color sequence and to customer's specifications.

GENERAL CABLE CORPORATION,
420 Lexington Avenue,
New York 17, N. Y.
Offices and Distribution Centers Coast-to-Coast.

for quality and service . . . **specify GENERAL CABLE**

NOW...SANGAMO

Small in size
Light in weight
Easy to handle
Easy to mount

INCREASED PRODUCTION FACILITIES

Dielectric packs are wound under controlled atmospheric conditions to eliminate any possibility of contamination.

This modern Sangamo plant in Pickens, South Carolina, now supplements the Illinois facilities for capacitor production.

SECONDARY CAPACITORS!

to release transformer capacity, reduce losses, and improve voltage levels on secondary circuits

Sangamo secondary voltage rated capacitors are built with the same processing care and to the same high standards that have put Sangamo Diaclor Primary Capacitors on the "approved list" of most major utilities in two short years. They are built to distribution engineer's specifications—with *all the features you want* to meet your service requirements.

CORROSION-RESISTANCE THAT'S MORE THAN SKIN DEEP—Cylindrical cases are of all welded steel construction, with mounting supports brazed to the case. There are no pockets to accumulate dirt or moisture. Tin plating, aluminum metallizing and two coats of baked vinyl resin base paint provide corrosion resistance even when case is scratched.

CYLINDRICAL DESIGN WITH HIGH PURITY KRAFT PAPER AND ALUMINUM FOIL—Provides an efficient unit with minimum weight and size. Elimination of foil tabs prevents possible injury to paper.

SPECIAL DIACLOR IMPREGNATION FOR STABILITY OVER A WIDE TEMPERATURE RANGE—These capacitors operate at temperatures from –40°C to +46°C.

INTERNAL DISCHARGE RESISTOR TO PROTECT LINEMEN—Reduces residual voltage to 50 volts or less in one minute.

PERMANENT HERMETIC SEAL WITH SOLDER SEALED BUSHINGS—Wet process porcelain bushings, metal bonded to the case, provide gasketless seal. Clamp type terminals are of tinned copper alloy, can be used with any type of conductor.

UPRIGHT OR INVERTED SWIVEL MOUNTING—Enables best utilization of available pole space.

Order from your Sangamo Representative, or write us for complete information and prices.

Size	Diameter	Overall Height	Net Weight
3 KVAR	5-7/16"	15-3/8"	18 lbs.
5 KVAR	5-7/16"	21-3/8"	28 lbs.

PC57-2

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

FURNISHED WITH POLE MOUNTING BRACKET THAT PERMITS LAG SCREW MOUNTING TO POLE—Standard EEI-NEMA cross-arm mounting bracket can be furnished when specified.

GROUNDING LUG—A grounding clamp for up to No. 2 solid wire is part of the mounting-bolt assembly.

LEADS—Two 48-inch, 600 volt insulated flexible copper leads are furnished.

INDICATING FUSES—Integrally mounted with the leads, can be furnished at extra cost. Fuse waves a red flag as positive signal for outages—stays intact after operation.

Progress Report

2,000,000 lb/hr

View looking upward in the reheater section, showing the 126-ton steam drum being raised into position. Shipped completely fabricated from Foster Wheeler's Mountaintop, Pa., plant, the first of the two steam drums arrived on the job-site on May 28, 1956 and was raised into position on June 1st.

Reheater section steam drum suspended in approximate position for final location, viewed from upper level.

Reheater section showing steam drum, headers and hangers in place, looking upward from 7th floor level.

on World's First

STEAM GENERATOR

Record-shattering FW steam generator for Detroit Edison's River Rouge Plant will deliver 8,620 btu per kwhr for 320,000 kw Unit No. 3

THE first steam generator ever designed to produce 2,000,000 pounds of steam per hour is now well under construction at Detroit Edison's River Rouge Plant. This huge FW steam generator, for 320,000 kw Unit No. 3, will also be one of the most efficient and economical units ever built. With a heat rate of 8,620 btu per kwhr, it will produce a kilowatt of electricity from less than ¾ lb of coal!

Designed for a pressure of 2700 psi, with 2450 psi and 1050F at the superheater outlet, it includes reheat facilities for resuperheating the steam to 1000F after it has passed through the initial stages of the turbine.

This single-unit FW steam generator consists of two separate sections, each containing a radiant superheater. All of the convection superheater surface is located in the "superheater section" and all of the convection reheater surface, in the "reheater section." Firing of the reheater section furnace is controlled to maintain 1000F reheat steam temperature, while the superheater section furnace is fired to maintain primary steam pressure. Primary steam temperature of 1050F is controlled by condenser-type desuperheaters.

The photographs included here show progress in the erection of this history-making FW steam generator at the River Rouge plant. This outstanding installation is another example of Foster Wheeler's ability to meet the most exacting requirements of modern power plant operation. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

View of economizer space of the superheater section, looking downward from the 9th floor level.

Reheater section economizer, also viewed from 9th floor elevation during construction.

Foster Wheeler's Construction Superintendent H. A. Shouse and Field Materials Coordinator A. K. Broome inspect radiant wall tiebacks.

A U-BOLT CLAMP YOU CAN WORK HOT!

Two types of taps available: with Compression Fitting or Split Bolt

BLACKBURN

Choice of Aluminized Hex Nuts or Plated Malleable Basket Nuts

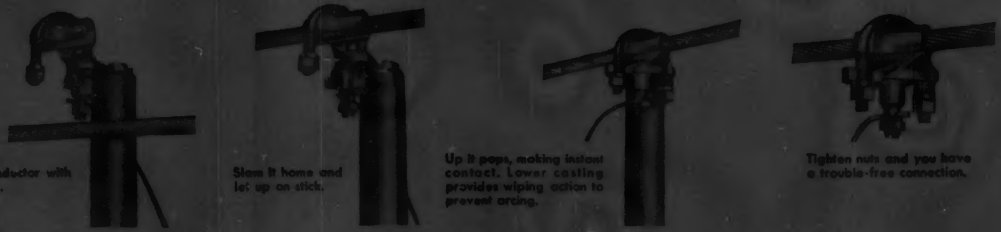
Here's a hot line clamp with all the advantages of a U-bolt connection. Reduces costly service calls and burn-downs. Costs more than conventional hot line clamps—*and worth it!*

Castings and hardware of aluminum alloy. Standard tap of tin plated bronze—compression tap of aluminum.

Main—3/0 to 336.4 ACSR—4/0 to 400 MCM AWG
4 to 2/0 ACSR over Armor Rod
Standard taps—from 6 AWG to 2/0 AWG
Compression taps—from 6 to 1/0 AGSR

Patent Applied For

SWIVELOK



Hang over conductor with shotgun stick . . .

Slam it home and let up on stick.

Up it pops, making instant contact. Lower casting provides wiping action to prevent arcing.

Tighten nuts and you have a trouble-free connection.

Send for your FREE SAMPLE Today!

JASPER BLACKBURN CORPORATION

35 MADISON STREET • ST. LOUIS 4, MO. • PHONE MAIN 1-2821

WHITEWAYS | DOWNTOWN | PRIMARY TRAFFIC | SECONDARY TRAFFIC | RESIDENTIAL

FILAMENT LUMINAIRES, the type in greatest use today, are lowest in inicial cost, highly flexible, and offer good color quality.

MERCURY LUMINAIRES, often used to attain the higher illumination levels, are characterized by long lamp life, high lamp efficiency.

FLUORESCENT LUMINAIRES offer superior visibility, fine color, low glare, long lamp life, low maintenance, and low power consumption.

General Electric offers all 3 luminaire types to assure best lighting for every street

In attacking your street lighting problems, you naturally want all the available tools to select from. Such choice is automatic when you work with General Electric, because G. E. offers complete luminaire lines (and years of experience in applying each) for all three light sources: filament, fluorescent, and mercury.

This means two important things to you: First, no matter what type of street, or what special conditions exist, your General Electric representative can draw on these years of experience in advising you. Second, the advice you get will be impartial—based on engineering and economic facts—since G. E., as a full-line manufacturer, has no reason to favor one type of lighting over another.

VISION-ENGINEERED SYSTEMS

Let G. E. help your street lighting program on a *vision-engineered system* basis. On every lighting project, regardless of size or type, General Electric offers you:

PROJECT RESPONSIBILITY—one source of supply for *all* your street lighting needs, including complete control and auxiliary equipment as well as luminaires.

COMPLETE ENGINEERING ASSISTANCE—expert start-to-finish aid from field and factory lighting specialists.

RESEARCH LEADERSHIP—the industry's newest and most complete laboratory, development, and proving facilities are located at G.E.'s "Outdoor Lighting Center of the World" in Hendersonville, N. C.

Get the full *vision-engineered system* story from your nearest Apparatus Sales Office or authorized agent! General Electric Co., Schenectady, N.Y.

LIVE BETTER ELECTRICALLY

452-167

VISION-ENGINEERED STREET LIGHTING SYSTEMS

GENERAL ELECTRIC

NEWEST REASON WHY ALL TRANSFORMERS ARE NOT ALIKE

Transformer goes 1,000 mph

In just one hour, packaging test for General Electric distribution transformers gives as much punishment as 1,000 miles of travel over roughest roads. Result: You get G-E transformers in tip-top shape.

General Electric distribution transformers arrive at your door in crates designed to help cut your transformer handling costs . . . thanks to an eight-year package-development program and use of new testing equipment.

You can practically forget damage claims with all their red tape because damage in shipment is almost nil. You also avoid the expense and nuisance of recrating and reshipping for repairs.

New test equipment proves crate toughness

At our Package Development Laboratory, Schenectady, N. Y., we thoroughly test wood, wire, and crated transformers with the most modern test equipment available today. In test at left, for example, a vibrator gives in one hour as much punishment to a crated transformer as it would receive in 1,000 miles of travel over the roughest roads. In another test a different machine gives the crated transformer an impact equivalent to freight-car "humping" at eleven miles per hour.

Crate design conserves floor space, simplifies stacking

Warehouse men can conserve floor space because G-E crates permit stacking of transformers up to four high . . . can simplify handling because one lift truck can move as many as four transformers at a time.

Linemen save time because the transformers are easy to remove from the crates. A pair of snips quickly cuts the wire bonds.

Wreck proves crates protect transformers

G-E distribution-transformer crates probably got their toughest test in shipment—quite unintentionally. A freight car loaded with transformers derailed and overturned enroute to the G-E warehouse at Charlotte, N. C. Expecting transformer mayhem, General Electric and railroad officials rushed to the spot. But not one transformer was even scratched!

All Transformers Are Not Alike

Engineered packaging is only one advantage of General Electric distribution transformers. Others include *Formex* wire* for reduction in tank size, *new and improved circuit breakers* for self-protected transformers, *complete warehouse stocks* to save utility inventories—evidence that all transformers are *not* alike.

For complete information contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Schenectady 5, New York. 431-51

LIVE BETTER ELECTRICALLY

*Reg. Trademark of General Electric Co.

STACKED TWO HIGH on finger-lift truck, four crated transformers can be easily moved, loaded, and unloaded in minimum time.

IMPACT TEST, the equivalent to a freight-car "humping" at eleven miles per hour is given to crated transformer—without damage.

Progress Is Our Most Important Product

GENERAL ELECTRIC

New Jersey Power and Light Reports

GENERAL ELECTRIC PROGRESS LINE TWO-WAY RADIO PROVIDES MAXIMUM COVERAGE

New Progress Line Units Are Assigned Exclusively to Long-range Duty

After replacing many of its 100 mobile radio units with new General Electric Progress Line units, New Jersey Power & Light Company learned that the new G-E units perform so well that they are now assigned to the trucks that operate farthest from their base stations.

Get Greater Range and Better Reception

In addition to the excellent range of operation provided by the new General Electric units, Harold Mann, communications engineer, is enthusiastic about the high-fidelity quality of messages from mobile units. This, he explained, is due largely to the controlled reluctance microphones supplied with all Progress Line mobile units.

The utility's radio system includes 10 base stations throughout the northern half of New Jersey, 5 of which have 450-mc repeaters, and 100 low band 60-watt mobile units.

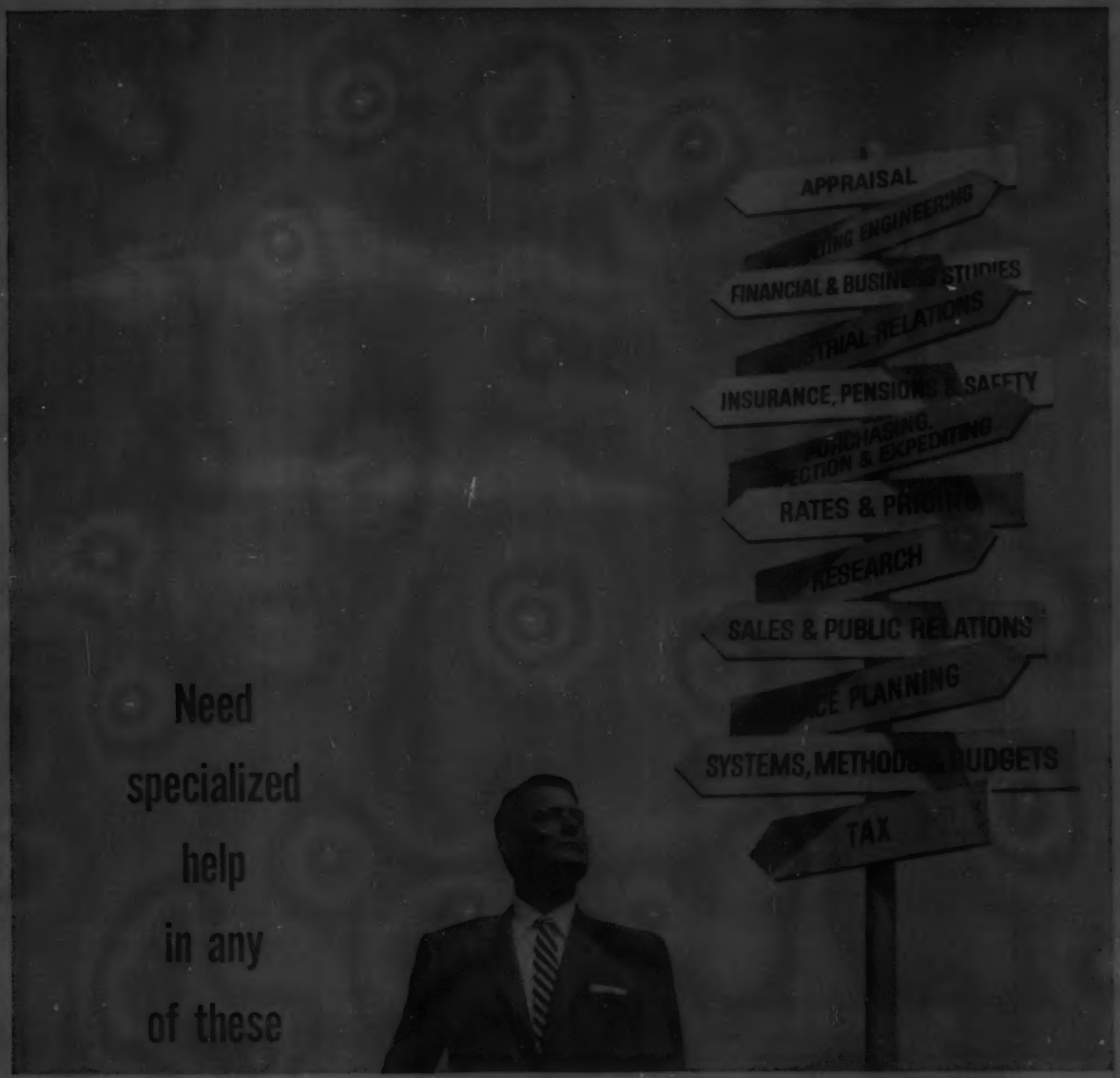
Maintenance of all New Jersey Power & Light Co. radio equipment is provided by the Warner Engineering Company, an authorized General Electric Service Station located in Upper Montclair, N. J.

The utility reports that its 10-year experience with radio has proven a maintenance contract with the General Electric Service Station is more economical than providing service through its own maintenance department, and is equally effective.

For Sales and Service...see "Radio Communication Equipment" in your yellow pages. Or, write: General Electric Company, Communication Equipment, Section C2237-25, Electronics Park, Syracuse, New York. *In Canada:* **C.G.E. Electronics, 181 Lansdowne Avenue, Toronto.**

Progress Is Our Most Important Product

GENERAL ELECTRIC



Need specialized help in any of these directions?

The modern approach to solving special operating problems is to call in specialized help. That way you don't divert your own key personnel from regular duties. You don't overburden your regular staff. And you save a maximum of payroll dollars. Backed by long experience in solving similar problems for utility companies throughout the United States and abroad, Ebasco gets to work promptly, gets the job done right and economically while your normal flow of routine operations continues.

Ebasco technicians are at your call anywhere and anytime you need them, for assignments large or small in any phase of utility operation.

EBASCO

NEW YORK • CHICAGO • DALLAS
PORTLAND, ORE. • WASHINGTON, D.C.

COMPLETE ENGINEERING AND CONSTRUCTION SERVICES

In addition to assisting with operating problems, Ebasco offers a complete engineering and construction service for building new facilities or additions to present installations—from initial planning to actual operation of the plant. A half century of experience in the electric power industry stands behind this service.

For a complete outline of the services Ebasco offers to the public utility industry, write for our booklet, "The Inside Story of Outside Help." Address: Ebasco Services Incorporated, Dept. M, Two Rector St., New York 6, N. Y.

SIMPLIFIES INSTALLATION: Anaconda Silvaline Type SE Cable—in ratings up to 200-Amps—

SILVALINE TYPE SE CABLES—100-AMP RATINGS OR MORE

(Copper Conductors)

CONDUCTOR	INSULATION	RATING (in amps)
3/C #3 with #3 or #5 neutral	RHW 75C	100
3/C #2 with #2 or #4 neutral	RHW 75C	115
3/C #1 with #1 or #3 neutral	RHW 75C	130
3/C #0 with #0 or #2 neutral	RHW 75C	150
3/C #3/0 with #3/0 or #1/0 neutral	RHW 75C	200

(Aluminum Conductors)

CONDUCTOR	INSULATION	RATING (in amps)
3/C #2 with #2 or #4 neutral	RHW 75C	100
3/C #1 with #1 or #3 neutral	RHW 75C	110
3/C #1/0 with #1/0 or #2 neutral	RHW 75C	125
3/C #2/0 with #2/0 or #1 neutral	RHW 75C	150
3/C #3/0 with #3/0 or #1/0 neutral	RHW 75C	170
3/C #4/0 with #4/0 or #2/0 neutral	RHW 75C	200

Even with 200-

you can install

Anaconda Silvaline* Type SE Cable is available in both copper and aluminum in sizes up to #4/0—large enough to handle even 200-Amp service. No conduit needed with Silvaline; save time and money in installation.

can be installed *without conduit* from weatherhead to meter to fuse box, and then to range.

Amp service—
Silvaline Cable without conduit

Even with higher ratings no conduit is required with Silvaline Service Cable. And it's fully approved.

Now, with more and more builders specifying 100-, 200-Amp service—to meet the need for more power to run today's and tomorrow's hot-water heaters, heat pumps and other heavy-current appliances—the time and labor you save installing Silvaline in place of both cable and conduit may be the margin of a successful bid. Silvaline also offers . . .

Longer life under severe conditions. Silvaline is the only service entrance cable with URC† saturant and finish. Resists festooning . . . assures long life.

No complaints. Silver finish on Silvaline takes any type or color of house paint . . . won't bleed through, flake or peel. Ends customer complaints.

Silvaline can be installed from pole to meter to panel box—and then to range.

See the Man from Anaconda or your Anaconda distributor for full information. Also—send for folder on Silvaline Type SE Service Cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 8709

*Reg. U. S. Pat. Off. †Utilities Research Commission

ASK THE MAN FROM **ANACONDA®**

FOR SILVALINE TYPE SE
SERVICE ENTRANCE CABLE

Who's cutting whose throat?

THE "scourge of below cost bidding" continues to eat away at the contracting industry — *and this in a time of the greatest construction boom in history!*

Why? Shortage of electricians is chronic! Thousands are badly needed across the country to meet the mounting needs of commerce, industry and the mushrooming home modernization market.

Yet in spite of this, the industry seems caught up in a give-away mania that's leaving millions of dollars on the bidding tables.

Why? Well, several reasons. Some contractors underbid simply because they don't know their own costs. Others, possessed by an urge to keep up a big front, try to maintain volume at any cost. Still others underbid merely to squeeze out competition and wind up on top.

The fact is that any selling involving consistent price cutting is suicidal — a form of salesmanship that can only lead eventually to large losses and bankruptcy.

A Way Out

Any way out of the squeeze? Yes, there is! This year the Electrical Industry is spending close to $10 million to help drop a *multi-billion dollar* Adequate Wiring market right in the contractor's lap.

And make no mistake about it, this rewiring business can be the highest profit business on your books — plenty of contractors have already proved it.

They like it because it helps take them out of the price squeeze. When a contractor sells a homeowner, for example, on the idea of "living better electrically," the only way competition can beat him out is by selling better ideas (selling up) — not by offering a cheaper job.

How To Get Your Share

Some contractors will wind up with a bigger share of the market than others. You can be one of these by following these suggestions: tie in with such powerful national promotions as the "Housepower" and "Live Better ... Electrically" Campaigns.

Sell the advantages of modern electrical living at every opportunity — through friends, civic and trade associations, neighbors.

Thirdly, present these advantages to your customers in terms they can understand — not in technical jargon. They'll buy when you point out the safety, comfort and convenience of a modern electrical system.

You, the contractor, are the industry's most intimate contact with the consumer. It is to you he will turn for the professional advice he needs. You should be prepared to fill that need.

Published in the interests of the Electrical Industry. Reprints of this message are available by writing to Dept. QCA at:

MURRAY MANUFACTURING CORPORATION
1250 Atlantic Avenue, Brooklyn 16, New York

Murray

Manufacturers of: Safety Switches, Service Entrance and Meter Mounting Equipment, Fuse Panels, Fully Magnetic Circuit Breakers and Load Centers.

ADEQUATE WIRING SERVES SAVES

HOUSEPOWER

LIVE BETTER ELECTRICALLY

OPERATION HOME IMPROVEMENT

FOR A HAPPIER AMERICA AT HOME

A Westinghouse Exclusive

A FOUR HOUR LOAD PICKUP JOB DONE IN FIVE MINUTES

. . . by two new Westinghouse automatic load pickup switches.

Manual restoration on the same circuit, by conventional sectionalizing methods, required four hours and much man power. The line covered 75 circuit miles of 6.9-kv service, with 1309-kva transformer capacity. Under automatic load pickup re-energization, *no protective equipment was subjected to overload for more than one-half cycle.*

The Westinghouse LP automatic load pickup switch is a 15-kv, 200-ampere unit for all voltage ratings from 2.3- to 15-kv. Thermal time-delay is available in increments of two seconds to five minutes. Complete details are available from your nearby Westinghouse sales representative — or by requesting Bulletin 38-860 from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-80909

For a complete engineering report on the application described, write the address at left, asking for reprint No. 5235.

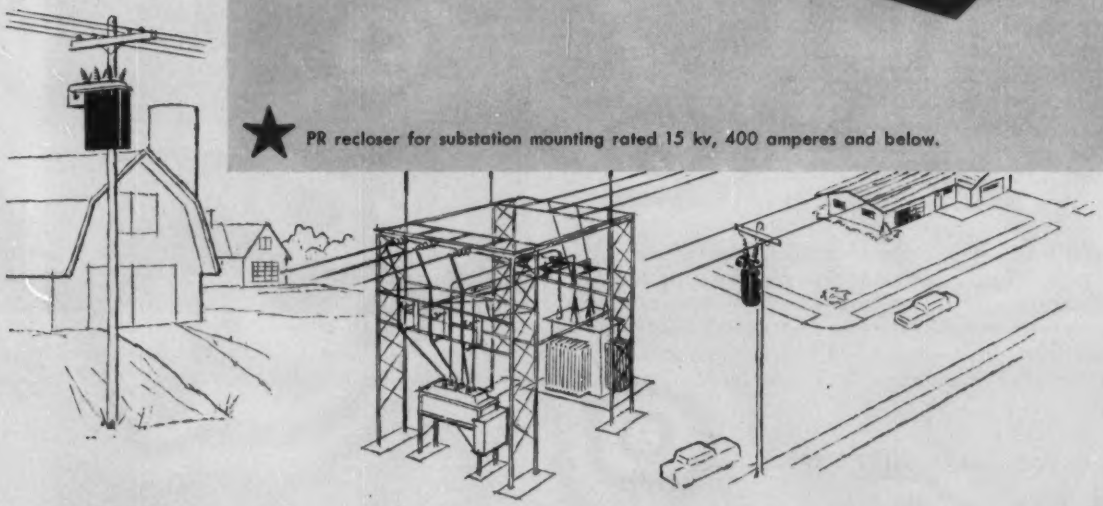
YOU CAN BE SURE ... IF IT'S

Westinghouse

THE WESTINGHOUSE RECLOSER LINE PRESENTS...

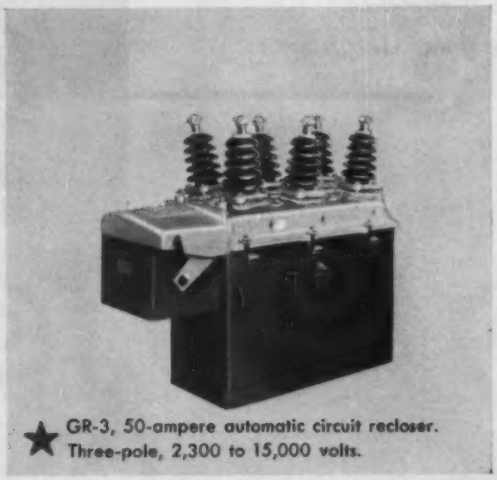
Featurama...an unmatched

★ PR recloser for substation mounting rated 15 kv, 400 amperes and below.



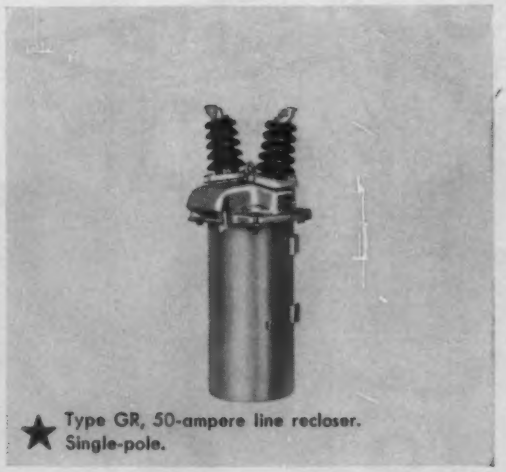
but widely imitated all★star production

★ GR-3, 100-ampere automatic circuit recloser. Three-pole, 2,300 to 15,500 volts.



★ GR-3, 50-ampere automatic circuit recloser. Three-pole, 2,300 to 15,000 volts.

★ Type GR, 100-ampere substation recloser. Single-pole.



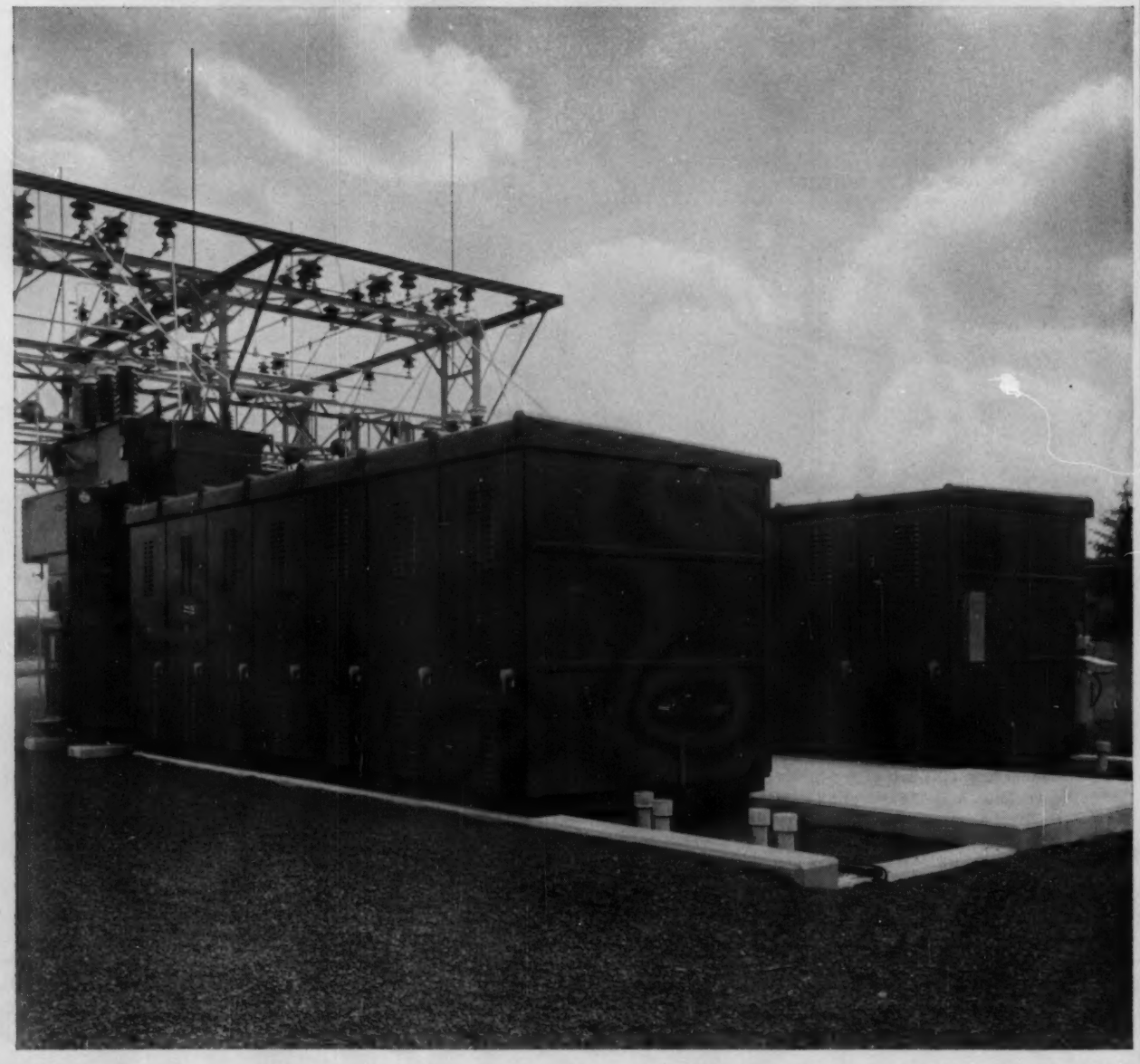
★ Type GR, 50-ampere line recloser. Single-pole.

★ Get these NEW features: ★ Big operation counter can be read from the ground—the only one that can be reset. ★ One-piece aluminum head casting gives better seal, less maintenance, longer life. ★ Manual operating handle shaft-sealed against dirt and moisture. Plus these long-time standards: ★ One-half to two-thirds as many parts. ★ Simple, reliable. ★ Exclusive De-ion® interrupter arc-quenching. ★ Single operation to lock out if manually closed on fault, not full-automatic cycle with resultant extra wear. ★ Time delay on manual close on cleared circuit rides through inrush load pickup. ★ Seamless, weldless, galvanized drawn-steel tank eliminates need for painting. ★ Integral surge and lightning protection in bushing-mounted arrester. ★ Two-to-three-cycle opening and power restoration. ★ Hydraulic timing—nine combinations of instantaneous and time-delay operation. ★ Bushings, coils and contact details interchangeable in 50- and 100-ampere series. ★ Built to the quality standards of the Westinghouse circuit breakers. ★ For complete details, ask your Westinghouse sales engineer or distributor for booklet B-4339—or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60921

YOU CAN BE SURE...IF IT'S Westinghouse®

Unit substations
designed to grow...
and to be good neighbors



BUILT-IN FLEXIBILITY TO ACCOMMODATE LOAD GROWTH, LOAD SHIFT

Planning for the future—in load growth and load shift—with minimum capital outlay today is a universal distribution problem. Westinghouse anticipated it—designed unit substations that can grow—and be good neighbors in residential areas, too.

For instance:

The box-type throat connection allows simple transformer interchangeability.

Standardized metalclad switchgear makes addition of feeder units economical and visually attractive.

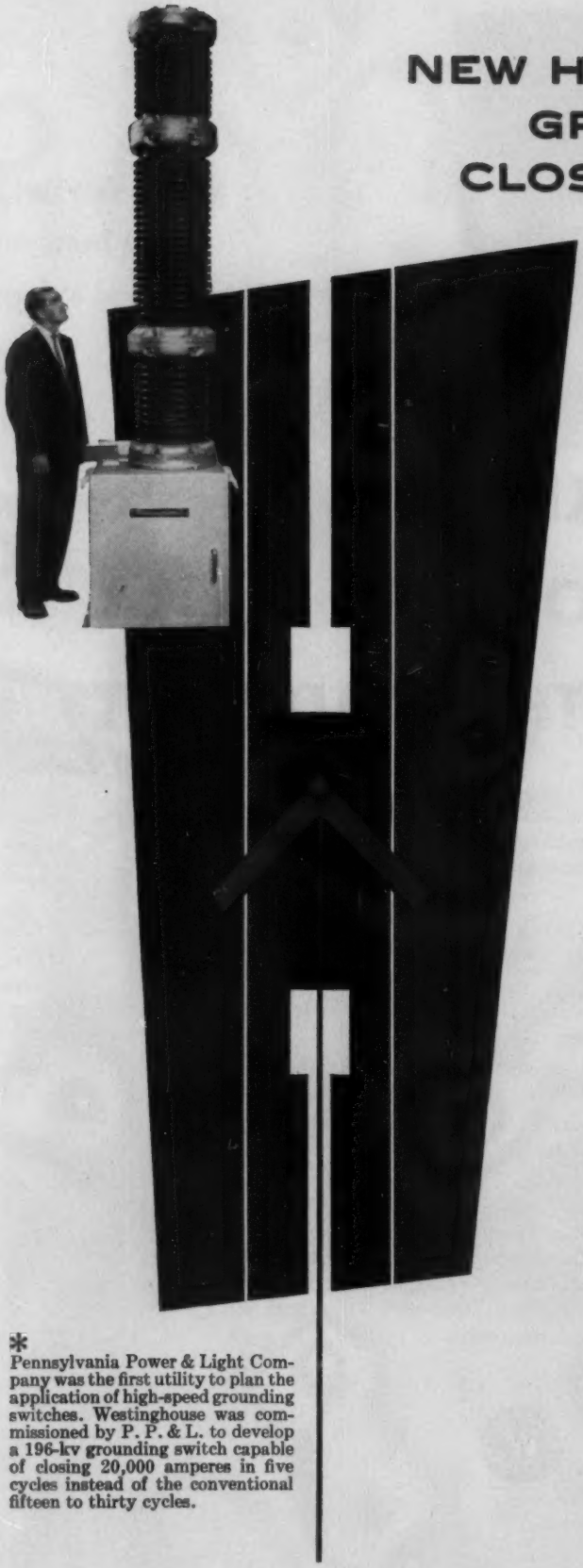
Single-end stations can become double-end with a minimum of installation time and manpower.

Appearance and new low-cost transformer soundproofing make them more acceptable—for less of your money—in thickly populated residential areas.

Moreover, *all* components of Westinghouse unit substations are engineered and coordinated by *one* manufacturer with complete control of design, manufacturing and assembly. Discuss your requirements with your Westinghouse sales representative and learn the full extent of the advantages to be gained. Or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa., requesting DB 34-250 for additional information. J-60014

YOU CAN BE SURE...IF IT'S

Westinghouse



NEW HIGH SPEED GROUNDING SWITCH CLOSES IN 5-CYCLES

Applied by P. P. & L. to Protect Large Power Transformers by Initiating Tripping of Remote Circuit Breakers*

Six times the speed of conventional grounding switches—fully enclosed and impervious to weather. It's revolutionary in design.

The 196-kv unit illustrated is one of two units at the P. P. & L. Peckville substation. In case of trouble in the zone protected by the transformer differential relays, the relays operate the grounding switch, initiating a ground on the line. This ground fault trips circuit breakers at the remote end of the line and clears the circuit before extensive damage can occur. This scheme is much more economical and just as reliable as other methods of protection.

The contacts and mechanism are fully enclosed. Blade action is reciprocal instead of swinging. Closing time is minimized by locating the contact structures relatively close together in an atmosphere of high-dielectric sulphur hexafluoride gas. The entire assembly is sealed so that replenishing gas is not necessary more often than every two or three years. The SF_6 itself does not deteriorate. Icing and temperatures as low as -40° have no effect on reliability or speed of operation.

Other voltage ratings of 69-, 115-, 138- and 161-kv will be available shortly.

Complete information, including user application particulars, is available from your Westinghouse sales representative.

J-60904

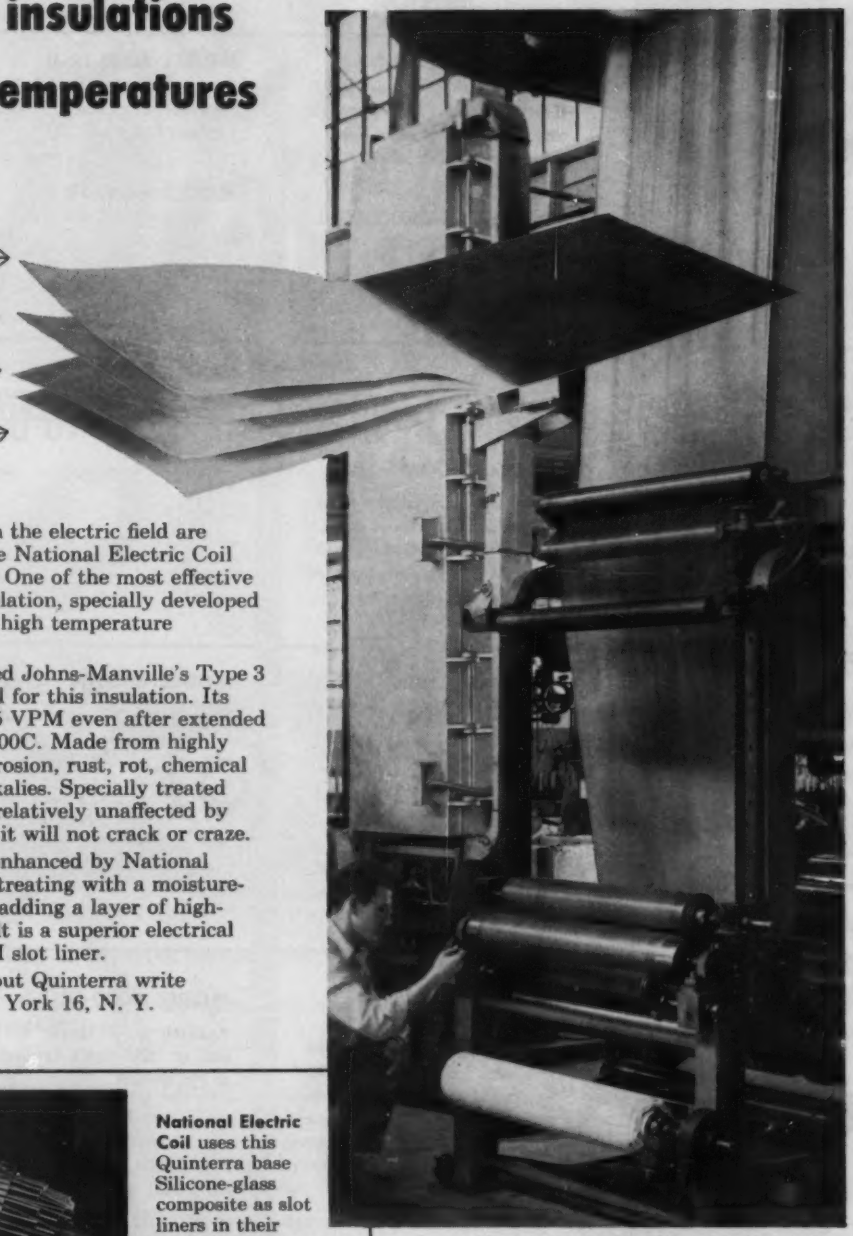
* Pennsylvania Power & Light Company was the first utility to plan the application of high-speed grounding switches. Westinghouse was commissioned by P. P. & L. to develop a 196-kv grounding switch capable of closing 20,000 amperes in five cycles instead of the conventional fifteen to thirty cycles.

YOU CAN BE SURE...IF IT'S

Westinghouse

How National Electric Coil Co. uses J-M Quinterra®

to make their insulations resist higher temperatures



High temperature problems in the electric field are constantly being solved by the National Electric Coil Company of Columbus, Ohio. One of the most effective solutions is their Silicone Insulation, specially developed for Class H motors and other high temperature applications.

National Electric Coil picked Johns-Manville's Type 3 Quinterra as the base material for this insulation. Its dielectric strength exceeds 225 VPM even after extended exposure to temperatures of 300C. Made from highly purified asbestos it resists corrosion, rust, rot, chemical fumes, solvents, acids, and alkalies. Specially treated with a silicone saturant, it is relatively unaffected by moisture. Strong and flexible, it will not crack or craze.

These basic properties are enhanced by National Electric Coil through further treating with a moisture-resistant silicone varnish and adding a layer of high-strength glass cloth. The result is a superior electrical insulation for use as a Class H slot liner.

For further information about Quinterra write Johns-Manville, Box 14, New York 16, N. Y.

Roll of J-M Quinterra Type 3 is here being treated with silicone varnish at National Electric Coil plant.

National Electric Coil uses this Quinterra base Silicone-glass composite as slot liners in their extensive motor repair operations. It is also available to others as Catalog #8A343 from their Columbus, Ohio, factory.

Johns-Manville ELECTRICAL INSULATIONS

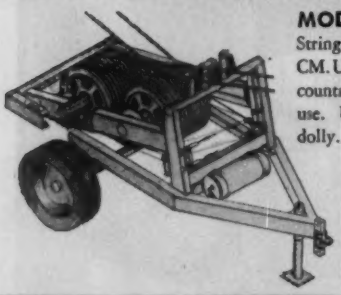
JM PRODUCTS

MADE OF PURIFIED ASBESTOS

Partial showing of the now ***COMPLETE*** line of . . .

PENGO TENSION WIRE STRINGING EQUIPMENT

Manufactured by **PETERSEN ENGINEERING CO.,** ***Santa Clara, Calif.*** **14 Patents Pending**

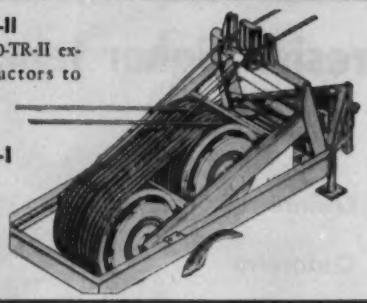


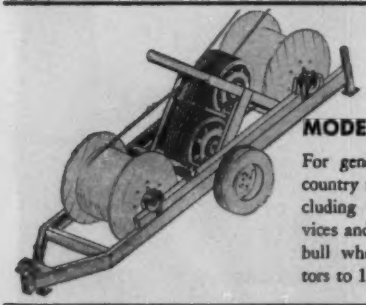
MODEL 5000-TR-II
Strings two conductors to 556,300 CM. Used primarily for very rough country work; also for general use. Use separate reel-carrying dolly.

MODEL 5000-TR-I
Similar except strings one conductor.

MODEL 6000-TR-II
Similar to Model 5000-TR-II except larger. Conductors to 1,272,000 CM.

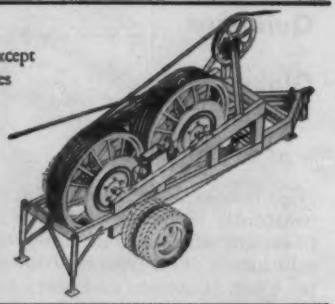
MODEL 6000-TR-I
Similar except for one conductor.

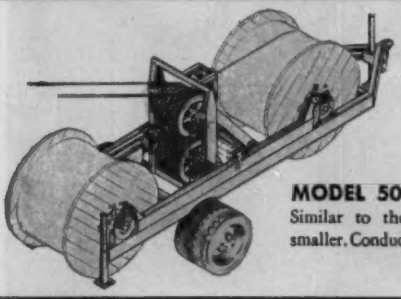




MODEL 6000-WS-TR
For general and medium rough country use. A complete unit including trailer, reel-carrying devices and its own double pair of bull wheels. Conductors to 1,272,000 CM.

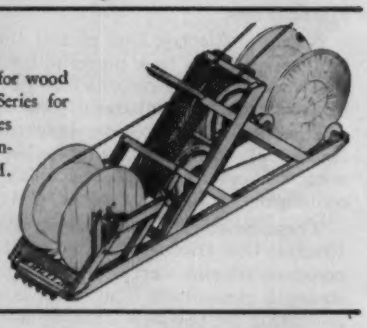
MODEL 7000-TR-I
Similar to model 6000-TR-I except larger. Conductors to 2 inches diameter.

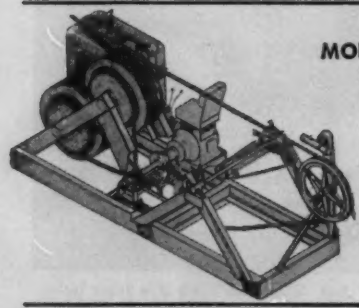




MODEL 5000-WS-TR
Similar to the 6000-WS-TR but smaller. Conductors to 556,300 CM.

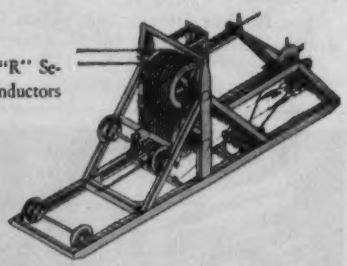
MODEL 6000-W
Available in "S" Series for wood or steel reels, in "R" Series for steel reels, or "SR" Series for trailer mounting. Conductors to 1,272,000 CM.

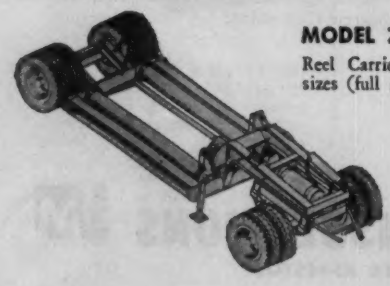




MODEL 6500
Bull Wheel Cable Puller. Available in "R" Series for steel reels, "S" Series for wood reels. Conductors to 1,272,000 CM. Also available in "LWR" Model for extra-large steel reels. Model 5500 similar (smaller).

MODEL 5000-SR
Available in "S" Series, "R" Series, or "SR" Series. Conductors to 556,300 CM.





MODEL 7500
Reel Carrier. Takes the largest sizes (full range) of steel reels. Loads and unloads with one man. No auxiliary equipment needed except the truck that pulls it. For use with any one of the tensioning machines shown on this page.

ADDITIONAL MODELS NOT SHOWN

Tension Reel Trailers

MODELS 2, 3, and 4, Two-Wheel Straddle Dollies not shown. For use with any one of the tensioning machines shown on these pages.

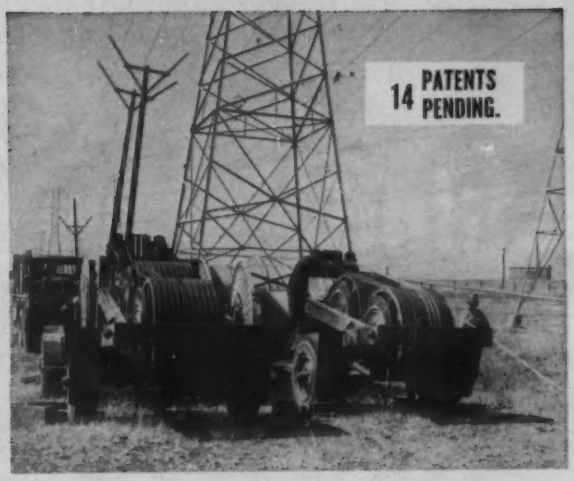
Tension Stringers

MODELS 6000-SK-I and 6000-SK-II For one or two conductors to 1,272,000 CM. Skid mounted for installation on owner's equipment.

MODELS 5000-SK-I and 5000-SK-II Skid mounted for installing on owner's equipment. For stringing one or two conductors to 556,300 CM.

MODEL 5000-WS-III Strings three conductors to 556,300 CM. For mounting on low-bed or full trailer.

MODEL 6000-WS-III Strings three conductors to 1,272,000 CM. For mounting on low-bed or full trailer.



Two PENGO model 6000 TR-II wire tensioners being used by Pacific Gas and Electric Co. in reconductoring job between Vacaville, Calif. and Cottonwood, Calif. 285 miles of 500 MCM copper is being replaced by 954 MCM aluminum in this operation.

Newest method of stringing overhead lines

Two PENGO model 6500 Bullwheel Cable Pullers used by Pacific Gas and Electric Co. for pulling in the new line on the job mentioned above. Unit, manned by an operator and one reel tender, pulls the pulling line (in this instance the old copper conductor) over the double neoprene lined Bullwheels and winds it for shipment in a single operation.

- ***Safest, most economical way of stringing transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits . . . by far the safest, too!***
- ***14 Patents pending!***

Smooth, positive control of conductor tension can be maintained at all times regardless of model or size of PENGO tensioning equipment used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

Note the wide range of models on the opposite page available for all types of jobs or terrain and for all sizes of conductor.

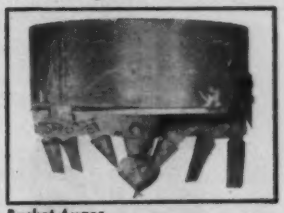
List your requirements and send for descriptive literature and prices.

Other PENGO Products include:

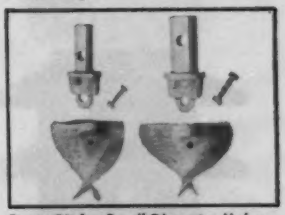
24 inch Heavy Duty Flight Auger

Double-Helix Heavy Duty Auger

Offset Boring Head



Bucket Auger



Screw Bit for Small Diameter Holes

Pulling Eye

Pole and Transformer Chariot

Made by the makers of the World-Famous
PENGO EARTH AUGERS

PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

PETERSEN ENGINEERING CO.
Santa Clara, California **Dept. 4**

Please send me more information on the new Pengo wire stringing equipment.

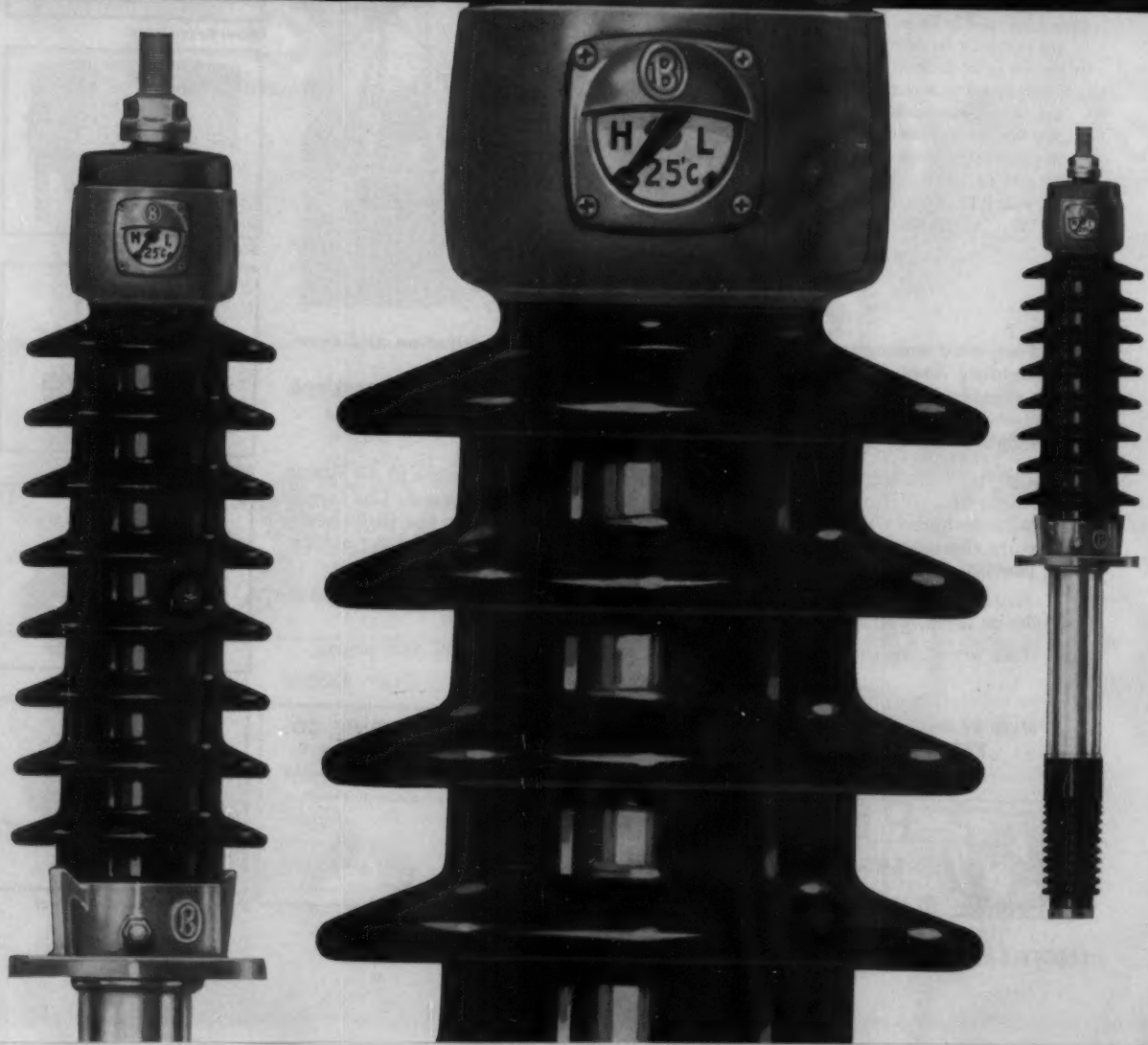
Name_____

Firm_____

Address_____

City_____ State_____

bushing standards mean big



savings

Only a short time ago, O-B had over 1,000 active drawing numbers covering bushings between 23 and 230 kv. Other bushing manufacturers had equivalent lists. Within our own production, and naturally between producers, there was no attempt to effect interchangeability.

Buyers of transformers and circuit breakers usually had to stock spare bushings for each catalog bushing in service. These spares were seldom used. They became obsolete and were scrapped when the apparatus was retired. And they cost at least several hundred, and perhaps thousands of dollars apiece!

If a bushing replacement was required during the life of the apparatus, the original manufacturer was usually the only source. Such a single replacement unit became an item of special manufacture. Delays were unavoidable. Costs were necessarily high.

The foregoing are just a few of the evils of non-standardization in the bushing business. The Ohio Brass Company has never liked it -- and said so!

ASA Standards can put an end to this chaotic condition. Variety can be drastically reduced. Many bushings, regardless of manufacture, can be interchangeable. One spare can serve a great quantity of apparatus. This spare will have indefinite useful life. Furthermore, it can be adapted to all older apparatus because of the larger clearances.

Individual power companies can assign their own dollar figure to the inventory economy such a standard will effect. In most cases it will be a very substantial amount.

ASA Standards now exist up to, and including, 69 kv. Higher voltages are approaching standardization. Does this mean "bad times" have come to an end? *It can* -- if users accept these standards and buy accordingly. Therefore, if they wish to avail themselves of the economies of standardization, they have to take a positive position in support of these standards. This is done simply by letting equipment manufacturers know of this preference, and by proper specification of apparatus.

Remember, standards assure only a physical likeness between bushings. In no sense whatsoever do they specify performance or a man's knowledge of his business. It may be well to consider adding "O-B" to other ordering information, and thus obtain a product having the finest characteristics yet reached in the Ohio Brass Company's half-century of prominence in the bushing industry.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

4791-H

Patent Applied For

We just might . . . if you happened to be in our sound test chamber. It has a lower ambient sound level than most radio broadcasting studios. If a transformer burps in here, saying "excuse me" won't help.

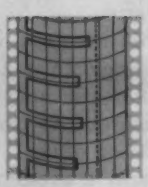


Chart Recorder records the measured sound level in decibels on each transformer. Units exceeding a pre-determined level (dotted line) are automatically rejected as substandard. A record is kept of the actual sound level in decibels for each unit.

Moloney has set permissible sound levels, for HyperCore Transformers, which are rigidly adhered to while transformers are under full excitation. Regardless of how well any of the other tests required have turned out, failure here automatically results in rejection.

Therefore, all HyperCore Transformers which are shipped from the factory will serve you well . . . and *quietly!*

HEE7-4

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers Industrial Dry Type Transformers • Transformers and Inductors for Electronics

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Let's Tell Our Story to Young Engineers

When engineers go job hunting they look for three things:

1. A challenging opportunity in a company with the potential for growth.

2. A good starting salary with regular increases associated with a permanent position.

3. A company with established prestige and reputation.

These are the facts turned up by a McGraw-Hill Co survey of 2,596 recently hired engineers with 57 blue-chip companies. The details of the survey and its findings are reported in this issue (page 86).

As we see it, employment in the electrical utility industry today offers every one of these appeals to aspiring young engineers.

First, there is plenty of challenge and potential for growth today in an industry that's simultaneously developing the use of supercritical pressure steam, extra-high voltage transmission, atomic power, and distribution to meet a demand for electricity that more than doubles every decade.

Second, utility starting salaries today need no apologies. An Engineers Joint Council Survey of 3,931 public utility and sanitary engineers shows a range of $325 to $435. These starting salaries are not so high as in some other industries, but neither is the need for engineers in the utility field of panic proportions.

The steady pace of salary increases that reward initiative and achievement in the utility industry is also discernible in the Engineers Joint Council curves, but don't be misled by the fact that the curve of average salary (see page 87) doesn't climb quite so fast after the first 20 years. The important point is that the curve of the enterprising top-salaried 10% keeps climbing steadily. In this top group salaries are 25% higher than average after 20 years and more than 50% higher after 30 years and still climbing.

Third, industry prestige has seldom been higher than it is today. The quality of its service and the integrity with which it discharges its public trust are beyond reproach. Few industries today enjoy greater respect than ours.

Here then is the promise of what utility employment holds for the young engineer:

An opportunity to grow with an industry that is growing in scope, in size, and in scientific dimensions.

A good starting salary that increases with proven initiative and achievement.

And a chance to work in an industry that has made the words "electric service" synonymous with progress and a better way of life.

Few industries hold a better promise for young engineers. Let's boast about it!

Public Service in the Best Tradition

Cleveland Electric Illuminating Co is to be commended for its recent move establishing a special emergency service to protect homes of polio patients against long service interruptions. For those who must depend on electrically powered respirators in their homes, this step should go far to erase any lurking fear of power failure from the minds of patients.

Working with the respirator care and rehabilitation center of a local hospital, the Cleveland company has compiled a directory of polio patients in its territory. Besides name, address, and phone number, it lists the type of respiratory equipment used in each home, its electrical requirements, and a doctor's estimate of how long the patient can be without his respiratory device.

Company communication centers have been equipped with this directory and are on a 24-hour alert. When a storm or other threat to service develops, the company trouble section is alerted at once should a polio patient's home be affected. The family is contacted immediately so they may know that the company is aware of the situation and that repairs are underway. The family is given an estimate of time required, and if needed one of several strategically located portable generators are dispatched. Line crews give first call restoration service to polio patient's home area, too. And if permanent repairs require more time, temporary repairs are made to restore service promptly.

Cleveland is certainly to be complimented for the thoroughness of its efforts to remove all fear from the minds of those whose lives depend on the reliability of electric service.

Relocation Bills: What's Happening?

From Wyoming's cold shoulder to Utah's warm reception, here's a run-down on state proposals for paying utilities to move poles under Federal Highway Act

Wyoming's Republican Gov Milward L. Simpson has vetoed a bill which would have required the highway department to pay utilities for moving facilities for highway development under the Federal Highway Act.

Meanwhile in Utah, Republican Gov George D. Clyde has signed into law a bill permitting the state to share the cost of relocating utility facilities.

About 25 proposals now lie in state legislative hoppers throughout the U. S. Most call for utility reimbursement on all federal-aid systems. A few limit reimbursement to the interstate system.

Legislation permitting partial or full reimbursement is already on the books in Connecticut, Vermont, Massachusetts, California, and Wisconsin. The California law limits reimbursement to freeways. The Wisconsin act limits reimbursement to one freeway.

In Tennessee, Idaho and Utah, legislation has passed both houses and has been signed into law during the current year. Tennessee's measure is directed mainly at the interstate system. The Idaho proposal covers all federally aided roads.

Three Bills Await Signatures

In New Mexico, Montana, and North Dakota, bills have passed both houses and now await gubernatorial signatures. The New Mexico and Montana bills provide for reimbursement on all federal projects. In North Dakota, the state will pick up 75% of the cost-of-moving tab.

Similar bills have been killed or died in the legislature this year in Arkansas and West Virginia.

"Who'll pay?" legislation has popped into headlines recently because the Administration's $36-billion federal-state highway program specifically underwrites relocating costs only for railroads. However, it permits states at their own discretion to allocate a portion of federal funds for utility relocation.

This would leave electric utilities ice-packing a $200-million headache for the next 13 years if national or state governments fail to pay for moving poles, lines, substations, and other facilities.

Why Simpson Vetoed Bill

Gov Simpson, in vetoing the Wyoming bill, said it would have "a disastrous economic effect" by depleting highway funds so they would "have to be made up by . . . additional taxes on highway users."

He also said it would be unfair to collect funds from highway users to subsidize utilities. He said utilities already benefit from using public rights-of-way without charge.

He added that the state's highway maintenance makes line maintenance less costly. The right-of-way stays clear of snow and other obstructions, making the lines easily accessible for repair, he said.

Relocation costs for the interstate construction program in Wyoming, he said, had been estimated at more than $12 million. This would mean a loss of 69.5 miles of highway.

"In essence," he said, "the question resolves itself to whether state highway funds should be paid to the utilities for payment of a cost that is part of their costs of doing business and not highway construction costs.

"The installation of the facility upon the highway right-of-way is in no way beneficial to the state, the public in general, nor the highway users who pay the cost of the construction of the highway.

"On the other hand, the installation of utility lines upon the state property is financially beneficial to the utility company," he said.

(For the case presented by utilities for reimbursement, see EW, April 11, 1955, p 16.)

Construction of Swift Tunnel Progresses

Progress on the main power tunnel at Pacific Power & Light Co's $44-million Swift No. 1 hydroelectric project on the Lewis River is shown in this view of current work. Visible at right, along roof, is canvas pipe for fanning fresh air into the tunnel and into the working face of the pilot bore. Two penstocks will branch off this main tunnel. Level section of the 25-ft-diam tunnel reaches 200 ft into rock and angles upward sharply. Rock walls will be lined with steel can-like sections. Construction schedule calls for lower sections to be completed by August. Work on powerhouse will then begin.

Should Utilities 'Bird-Dog' A-Plant Builders?

Rep Carl Durham infers this might smooth out some kinks in nuclear programs. But biggest problem, he says, is maintaining U. S. world leadership

Should utilities strengthen management and engineering personnel to direct nuclear projects?

This question was raised at the recent National Industrial Conference Board's meeting in Philadelphia by Rep Carl T. Durham (D- N. C.), chairman of the Joint Committee on Atomic Energy.

Durham said that co-ops and private power companies, with one exception, are contracting for development and construction of reactor plants on a "turn-key" basis to private equipment companies.

Equipment Companies Take Reins

"This amounts to practically complete delegation of technical and administrative direction of the project to the equipment company. The co-op or private company has few supervisory engineers or management specialists assigned to supervise or bird-dog the project. Yet in some cases, the equipment company has never before built a complete reactor.

"In contrast, the AEC in building the Shippingport reactor has a complete technical staff . . . and an extensive field management and procurement supervisory staff working with the prime contractor and subcontractors. Yet even here with an adaptation of an established design, it is taking more than four years to complete the . . . project."

Considerable Progress to Date

The overriding problem, in Durham's opinion, is how the U. S. can maintain world leadership in atomic energy. Despite criticism from various quarters, Durham said "we can point to considerable progress" in the civilian power field. "We have a remarkably diversified program at the experimental level."

To strengthen the U. S. program, Durham recommended:

- Construction of another plutonium-producing reactor at Hanford, using waste heat to produce power.
- Increased funds for reactor research and development by the Atomic Energy Commission.
- Inauguration of an accelerated domestic reactor demonstration program to provide a variety of power prototypes operating by 1962.

Meanwhile Harold S. Vance, Atomic Energy Commissioner, reminded the conference that Britain pushed ahead its atomic "crash" program because of a fuel scarcity. In contrast, the U. S. has abundant fuel reserves.

He cited the differing circumstances to "point out the fallacy of the statement that we are losing leadership in the atomic field simply because we are not planning to build immediately as many kilowatts of capacity as are some other countries. We are definitely ahead of the rest of the world in the technological development of atomic power, and I am confident that we will remain in this position," he said flatly.

Vance said U. S. leadership depends primarily upon what it can accomplish in the international field. He suggested that the U. S. support programs abroad which are tailored to fit the respective local needs. The U. S. should give foreign countries the benefit of U. S. research, and make available enriched uranium for fuel, he said.

Vance said he believes the U. S. effort to find out which basic type of reactor is the most promising will begin bearing fruit in a year or so. After that, he anticipates swift progress in development of power reactors "which will be helpful and not harmful (economically) to our American economy."

New Type Reactor Seen at Exposition

A model of an organic moderated nuclear reactor—a new type—was shown recently at the International Atomic Exposition in Philadelphia. Designed for commercial power production, the reactor is to be built by Atomic International, a division of North American Aviation, Inc, for installation in a Latin American country. Another organic-moderated reactor now is being built for experiments at Atomic Energy Commission's National Reactor Testing Station, Arco, Idaho (EW, March 4, p 50).

Capital Spending: Losing Steam?

Utilities laying bold plans, SEC-Commerce study shows. But business expansion is lower than last year

Utilities once again are out in front with programs for expanding plant and equipment. New government figures—from the Securities and Exchange Commission and the Department of Commerce—show utilities plan to about double 1957 investment in new plant and equipment over last year.

The survey indicates:

- The increase over last year should top $1.2-billion if present plans materialize, as against a $586-million gain last year.
- Expenditures will run over $6-billion this year, a rise of 24% over 1956.
- Of this total, electric utilities will spend $4-billion for new plant and equipment in 1957, a rise of about 30%.

6.5% Growth in '57 Capital Spending Predicted by SEC for Business

	1955	1956	1957*	% Growth '57 over '56
Manufacturing	11,439	14,954	16,414	9.8
Durable Goods Industries	5,436	7,623	8,498	11.5
Primary Iron & Steel	863	1,268	1,650	14
Primary Non-ferrous Metals	214	412	821	99
Electrical Machinery & Equipment	436	603	692	14.7
Machinery, except electrical	809	1,078	1,394	29.6
Motor Vehicles & Equipment	1,128	1,689	1,302	−22.9
Transportation Equipment, excluding motor vehicles	274	440	595	35
Stone, Clay, Glass Products	498	686	633	− 7.7
Other Durable Goods	1,214	1,447	1,411	− 2
Nondurable Goods Industries	6,003	7,331	7,916	8
Food & Beverages	718	799	798	....
Textile Mill Products	366	465	379	−18
Paper & Allied Products	518	801	835	4
Chemicals & Allied Products	1,016	1,455	1,799	24
Petroleum & Coal Products	2,798	3,135	3,403	8.5
Rubber Products	150	201	208	3
Other Nondurable Goods	437	475	494	4
Mining	957	1,241	1,221	− 2
Railroad	923	1,231	1,468	19
Transportation, other than rail	1,602	1,712	1,826	7
Public Utilities	4,309	4,895	6,062	24
Communication, Commercial & Other	9,471	11,408	10,370	− 6
TOTAL	**28,701**	**35,081**	**37,361**	**6.5**

*Estimated

Business Reduces Outlays

There is evidence that business generally does not seem to be planning quite as heavy outlays. The survey shows business overall plans to increase spending this year by $2.3-billion over last year—the third new peak total in a row.

But there's less steam in spending for new plant and equipment than government economists had expected: If the new record spending is achieved, the gain would be 6.5%. It was 22% last year.

Second Survey This Winter

The SEC-Commerce survey—taken in January and February—is the second covering industry's plans for 1957. The first was made last fall by the McGraw-Hill department of economics (EW, Dec. 17, 1956, p 16). It showed businessmen planned an 11% expansion. The two surveys are not directly comparable. The change from an 11% gain in the McGraw-Hill survey, to 6.5% in the SEC-Commerce survey, can't be taken as a measure of declining investment plans.

One reason is that SEC-Commerce gets reports from a great many small companies which are not included in the McGraw-Hill survey. The SEC-Commerce category of "commercial and other"—for example—shows a drop of $678-million in plans for 1957, compared to the 1956 actual. This is the biggest dollar drop of any category, and is due mostly to a decline in shopping centers and other retail construction. But because the category contains many small companies, it is not reflected to the same extent in McGraw-Hill's.

Prices May Take Toll

The government forecasters had counted on some pause in the rate of growth, figured a 1957 gain of about 10%. Now, on the basis of the survey figures, it's possible price rises will account for almost all of the 6.5% gain in total dollars, with little net gain in physical capacity.

Still, the government survey contains two indications of how businessmen in general view the rest of the year—both are cheerful:

- Sales are expected to rise 8% in manufacturing, 4% in trade, and 9% for utilities, measured in dollar value.
- Capital goods outlays for the second half of the year are expected to be practically the same as in the first half, with no hint of a gathering rush to cancel projects.

Inflationary Forces Easing

The survey results also point to a lessening of inflationary pressures, compared to 1956. But it throws a new question mark into the 1957 picture as seen in recent weeks by many government economists.

The overall gain of 6.5% has a healthy undertone which government analysts are quick to point out. It is not based on the spectacular performance of a few leaders, but is shared in by most industrial groups.

FPC Staff Advises Against PNP Project

Recommendation claims proposed federal Nez Perce is better adapted for comprehensive development of the Snake than Mountain Sheep-Pleasant Valley dams

The Federal Power Commission staff has recommended denial of the application of Pacific Northwest Power Co for a license to build a $168-million, 1-million-kw hydroelectric project on the Snake River in Idaho and Oregon.

In recommending denial of the application for the Mountain Sheep-Pleasant Valley project just below Idaho Power Co's Hells Canyon project, the FPC staff has given a boost to demands of public power advocates for construction of a federal Nez Perce dam.

For, said the staff, MS-PV is not best adapted for comprehensive development of this stretch of the Snake, whereas Nez Perce is. Nez Perce would flood out PNP's proposed sites since it would back up water to low Hells Canyon.

The recommendation came in a brief filed on the hearings into PNP's application and will be considered by Examiner Edward B. Marsh in preparing his initial decision subject to review by FPC.

Nez Perce Asset Stressed

Opposition to the company application by public power groups led by National Hells Canyon Assn had been based largely on the contention that Nez Perce would be better adapted for comprehensive development.

The recommendation made no mention of the intervention in the case by Interior Secy Fred A. Seaton, who wrote FPC recently he had ordered a feasibility study of the Pleasant Valley site with a view to building a higher dam there than contemplated by PNP.

While recommending Nez Perce construction over PNP's proposed project, the FPC staff does say that "Nez Perce development would be economically feasible for private . . . or federal financing and construction." However, the staff believes that "Flood control storage at Nez Perce could be facilitated by a federal contribution for that purpose similar to the program authorized in connection with the Markham Ferry project . . . in Oklahoma."

Nez Perce has figured in Army Engineers' reports since 1942. Generally, it has been regarded as one of the best sites for a dam in the Columbia River Basin. But it had one serious drawback: It would be located below the mouths of two important fish spawning grounds, the Salmon and the Imnaha rivers. Therefore, Army Engineers have not recommended immediate construction because they assumed the fish passage problem could not be solved soon.

Now, says the FPC staff, it appears that "as a result of studies made recently . . . enough progress has been made in solving the fish passage problem that Nez Perce should not be finally rejected by authorizing the proposed Mountain Sheep and Pleasant Valley developments . . ."

These were other findings:

- Nez Perce would produce over two-thirds more power than the combined output of PNP dams.
- There is an urgent need for flood control storage at the Nez Perce site, and Nez Perce in conjunction with Idaho Power's Brownlee dam would provide all additional storage for flood control and Snake basin above the mouth of the Clearwater River.

Experts Certify PRDC Safety

Witnesses at AEC probe say 'no public danger' from possible meltdown, affirm financial qualifications

Three weeks of cross-examination by labor union lawyers has failed to shake witnesses testifying before an Atomic Energy Commission hearing that Power Reactor Development Co's nuclear project at Monroe, Mich., will be safe.

The three AFL-CIO unions—auto, paper, and electrical workers—had requested the hearing on grounds it had not been established that the fast breeder reactor would be safe and that an AEC construction permit should be suspended.

PRDC witnesses previously had filed written statements. Cross-examination now is underway. Witnesses called to date are: Ernest R. Acker, PRDC vice president and finance committee chairman; Dr Hans A. Bethe, of Cornell University, adviser to Atomic Power Development Associates which is doing research for PRDC; and Dr Norman Hilberry, director, Argonne National Laboratory.

Bethe and Hilberry both insisted the Enrico Fermi plant, as it has been named, will be entirely safe at the chosen location.

Bethe said sufficient information had now been developed to establish (1) there was no public danger in a meltdown in the reactor; (2) in event of a meltdown the uranium could not assemble in critical mass and produce an explosion.

Acker sought to give assurance on PRDC's financial ability to undertake the project. This factor had been questioned by AEC itself. He said the 23 PRDC utility and industrial member firms would contribute $23.5 million and that a group of banks had agreed to loan PRDC $15 million. Research contributions from AEC and APDA and savings in equipment furnished by APDA would contribute the rest of $43.2 million estimated cost.

Big Issue at TVA: Who Will Succeed Curtis?

Rep Baker and Edward Mynatt appear best bets for nomination to fill forthcoming vacancy on TVA's three-man board, but support for each is divided

The question, "Who will succeed Dr Harry A. Curtis?" is a top Tennessee Valley Authority issue these days. But there doesn't seem to be any agreement on the answer.

Curtis, whose nine-year term as a member of the TVA board of directors expires May 18, will soon be 73 and has stated he is not interested in reappointment to the three-member board.

Many people in Tennessee believe President Eisenhower's nomination has narrowed to a choice between Rep Howard Baker (R-Tenn.) and Edward F. Mynatt, assistant general counsel for the Agriculture Department.

Although Mynatt has substantial support in his open bid for the directorship, Baker is believed to have better chances for appointment.

Tennessee GOP Chairman Guy Smith is reportedly pushing Baker and has secured the support of former GOP National Chairman Leonard Hall. And Sen Estes Kefauver (D-Tenn.) recently said that although he would prefer to see Curtis renamed, Baker would "certainly do the right thing by TVA if he is appointed."

Baker Denies Candidacy

But Baker has made numerous public statements that he is not a candidate for appointment. He said recently, "I am fully convinced that I can render more effective service to the people who elected me last November to a fourth term in Congress and can do more for TVA and the area it serves by remaining a member of Congress than I could as a member of the board of TVA.

"Consequently I think it only fair to myself and to my friends to say that, not only have I not been approached by the White House on the question, but if the appointment were offered I would decline to accept it."

Mynatt Refuses Alternative

At the same time, efforts are being made to get Mynatt to step aside and accept an important appointment to a high administrative job in TVA. Mynatt recently confirmed that such a proposal had been made but said he turned it down. In fact, the outspoken refusal attributed to him may have jeopardized his chances for the board post.

Mynatt has the support of former REA Administrator Ancher Nelson and other influential Republicans. Strangely enough, he is also acceptable to Clyde T. Ellis and other high officials of National Rural Electric Co-operative Assn, generally outspoken critics of the Administration's power policies.

Congressional sources believe the Senate would confirm either Baker or Mynatt, but Baker would be almost certain to run into the opposition of Alabama Sens Lister Hill and John Sparkman.

Baker has generally supported TVA legislation and has often been a lone wolf in speaking out for steam plant appropriations. However, Hill and Sparkman reportedly would oppose Baker on grounds that his nomination would be a political appointment in violation of the TVA Act.

Kentucky Groups Set Standards

Meanwhile, Kentucky Sens John Sherman Cooper and Thurston B. Morton have promised they will try to persuade Eisenhower to appoint "an outstanding man pledged to preserve the integrity of TVA as an independent agency."

They made this promise to 20 representatives from four rural electric co-operatives and seven municipal distributors of TVA power in West Kentucky. These delegates visited Washington recently to urge White House nomination of a director who would measure up to certain standards, but did not recommend any specific candidate.

Those standards are: The appointment should not be a political one; the nominee should be dedicated to the public welfare and should "believe in the TVA act and have the vision and ability to help TVA grow as a national asset and an international symbol of democracy in action"; and residence in the TVA area should not be a criterion for nomination.

Tennessee Backs 'Friend of TVA.'

In Tennessee, meanwhile, the state senate has adopted a resolution urging President Eisenhower to select a man friendly to TVA to fill the upcoming vacancy.

The resolution said the man should be "not only qualified by education, experience, and ability to serve as an executive and policy-making officer of this great $2-billion conservation enterprise, but also qualified through his political and economic philosophy and sympathies and respect for TVA traditions to understandingly carry out the principles and purposes of the TVA act."

Diesel Aids Oberlin

Oberlin (Ohio) Municipal Light & Power Dept faced a power crisis Feb. 13 when a timing gear broke on a 2,000 kw diesel generator. Ten days earlier, a 1,136-kw generator burned out. This left the plant with 2,193 kw capacity and a normal load of 2,600 kw. But General Motors Corp came to the rescue. It shipped a mobile diesel generator by rail to the town to help out for four days while repairs were made.

Rainmaking in California

Cloud-seeding experiments, aimed at filling water storage reservoirs in Santa Clara County, Calif., paid off last year with a 33% increase in rainfall in key areas. George L. Sullivan, dean emeritus of University of Santa Clara's school of engineering, says, however, it is too soon to say how successful the experiments were. Compared with rainfall over a 10-year period, target areas got the same rainfall the first year of the experiments (1953), got 10% more the second year (1955), and 33% more last year. Said Sullivan: "The improved record may be due partly to chance, partly to better methods."

Who's Swiping the Wires?

From the hilly Kermit-Marrowbone Creek area of southern West Virginia comes a report from Appalachian Electric Power Co that somebody's swiping copper neutrals, primaries, and even transformers off 7,200-v rural lines—presumably for the copper.

It all began when the thieves chopped down a pole and took two spans of wire and a transformer's copper innards. Later, a second pole was felled and 25 customers were out of power while two spans were heisted.

Then the thieves apparently figured out how to get the wire without inconveniencing AEP's customers. One night they went to work, using a ladder fashioned of saplings from a nearby wood. The next day AEP discovered more than a mile of neutral line missing.

As in every good mystery, the police are baffled.

Trouble at Kearny

Accidental loss of pressure in the main oil system of a 145-Mw tandem-compound turbine-generator unit at Kearny Station, Public Service Electric & Gas Co, Feb. 9, resulted in substantial damage to rotating elements of the machine.

Pending a final report, preliminary findings suggest oil was accidentally bled from the operating system. Mechanical damage to an oil level alarm device was a contributing factor. Complete loss of oil pressure on the turbine and main and auxiliary generator bearings resulted.

Loss of oil pressure resulted in wiping of the bearings, grooving of the journals, misalignment of the rotor and damage to shroud rings on three rows of turbine blades. There was also a local oil fire of limited extent at the turning gear.

A spokesman for Public Service said the machine "came through remarkably well in view of the complete loss of pressure on the main oil system." Fire damage was minor. All spindles were salvageable. Main and auxiliary generator windings were undamaged.

However new bearings for the turbine, and main and auxiliary generators will be required and the journals will be "turned down." Shroud rings and three rows of blades will be replaced.

All rotating parts of the unit were shipped to the General Electric Co in Schenectady, N. Y., for repair and testing. The machine is expected to be back in service by June.

Government Buys American

The Department of Interior is passing up two low foreign bids on hydraulic turbines to award the business to an American manufacturer. The award was made a few days after the Office of Defense Mobilization had let it be known that it was rejecting an appeal to ban federal purchases of foreign-made hydraulic turbines. Instead, retiring ODM Director Arthur S. Flemming said it had been decided to make decisions on a case-by-case basis.

Interior's orders involved three small turbines for which American Elin, Corp, an Austrian firm had submitted bids totaling $225,000, and the successful bidder, James M. Leffel Co of Springfield, Ohio, had bid $295,000. Leffel Co got the bid on grounds of "national defense essentiality."

Coloring Grand Coulee

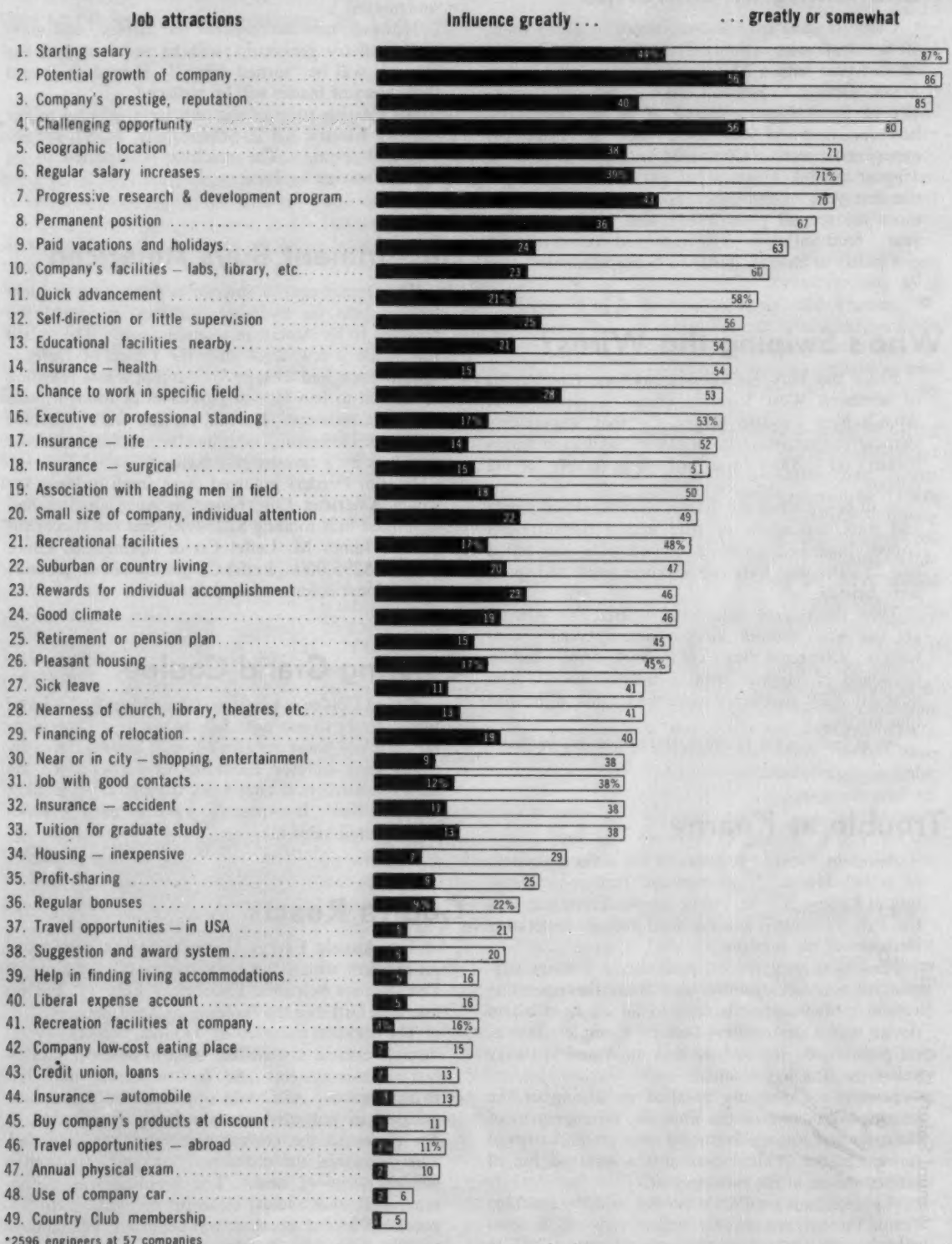
Grand Coulee is to get massive clusters of colored lights, ready to use next fall, to create a "spectacular" that will boost the area's tourist business. Nearby towns have suffered declining economies since the dam's construction ended. Washington State likes the idea too. It expects to rake in more pennies via its retail sales tax.

Godiva Reacts

The Atomic Energy Commission has announced an incident which "severely damaged" a facility at Los Alamos Scientific Laboratory Feb. 12, but no one was hurt and the building escaped damage.

The accident occurred to "Godiva," one of several "simple critical assemblies" used to develop data on fast-neutron systems and for subjecting materials to irradiation. AEC said uranium-loaded graphite, encased in polyethylene, was being irradiated. It got closer to the critical assembly than intended. This increased the chain reaction and produced a sudden surge of heat. The building was decontaminated by standard clean-up methods. No appreciable loss of uranium was reported, but damage to the assembly is impractical to repair, AEC reports.

Recruiting Engineers? Two Recent


Job attractions
Influence greatly . . .
. . . greatly or somewhat
1. Starting salary 44% 87%
2. Potential growth of company 56 86
3. Company's prestige, reputation 40 85
4. Challenging opportunity 56 80
5. Geographic location 38 71
6. Regular salary increases 39% 71%
7. Progressive research & development program 43 70
8. Permanent position 36 67
9. Paid vacations and holidays 24 63
10. Company's facilities – labs, library, etc. 23 60
11. Quick advancement 21% 58%
12. Self-direction or little supervision 25 56
13. Educational facilities nearby 21 54
14. Insurance – health 15 54
15. Chance to work in specific field 28 53
16. Executive or professional standing 17% 53%
17. Insurance – life 14 52
18. Insurance – surgical 15 51
19. Association with leading men in field 18 50
20. Small size of company, individual attention 22 49
21. Recreational facilities 17% 48%
22. Suburban or country living 20 47
23. Rewards for individual accomplishment 23 46
24. Good climate 19 46
25. Retirement or pension plan 15 45
26. Pleasant housing 17% 45%
27. Sick leave 11 41
28. Nearness of church, library, theatres, etc. 13 41
29. Financing of relocation 19 40
30. Near or in city – shopping, entertainment 9 38
31. Job with good contacts 12% 38%
32. Insurance – accident 11 38
33. Tuition for graduate study 13 38
34. Housing – inexpensive 7 29
35. Profit-sharing 9 25
36. Regular bonuses 9% 22%
37. Travel opportunities – in USA 5 21
38. Suggestion and award system 6 20
39. Help in finding living accommodations 5 16
40. Liberal expense account 5 16
41. Recreation facilities at company 4% 16%
42. Company low-cost eating place 3 15
43. Credit union, loans 4 13
44. Insurance – automobile 3 13
45. Buy company's products at discount 3 11
46. Travel opportunities – abroad 4% 11%
47. Annual physical exam 2 10
48. Use of company car 2 6
49. Country Club membership 1 5

*2596 engineers at 57 companies

Studies Offer Some New Tips

McGraw-Hill survey results (opposite page) indicate benefits and appeals that influence job choice. EJC study (chart below) discloses median salary ranges

The "engineers wanted" plea is a sign of our times. In college recruiting programs, in advertising efforts, in other ways, electric utilities must compete for qualified technical manpower to carry out the industry's expansion plans.

Results of two recent surveys offer some preliminary data that may give recruiting campaigns better aim. But a word of caution: Both of these are across-the-board industry surveys. Figures haven't been developed yet that apply directly to the electric utility industry.

Chart on the opposite page indicates what engineers are looking for when they take new jobs. It represents the replies of 2,596 recently hired engineers to a survey of McGraw-Hill's Classified Advertising Division. Purpose of the survey was to help advertisers and agencies determine the most effective appeals for their "help wanted" ads.

These results point up three areas of importance in motivating an engineer to select a job. The areas are:

- Opportunity within the company. The employment factors "challenging opportunity" and "potential growth of the company" received about the same number of mentions—both up near the top and enough to rank "opportunity" as the single most important motivating force.
- Salary and security offered by the company. "Starting salary" was also a top runner, with "regular salary increases" and "permanent position" fifth and seventh, respectively, in order of importance in job selection. Thus salary and security ranks as a close second among the motivating forces.
- Company prestige and reputation. This motivation area ranked third in its overall influence.

Bonuses Have Little Appeal

Employment benefits having little importance in job selection, according to this survey, are "regular bonuses," "profit sharing," "company low-cost eating place," and "recreational facilities at the company."

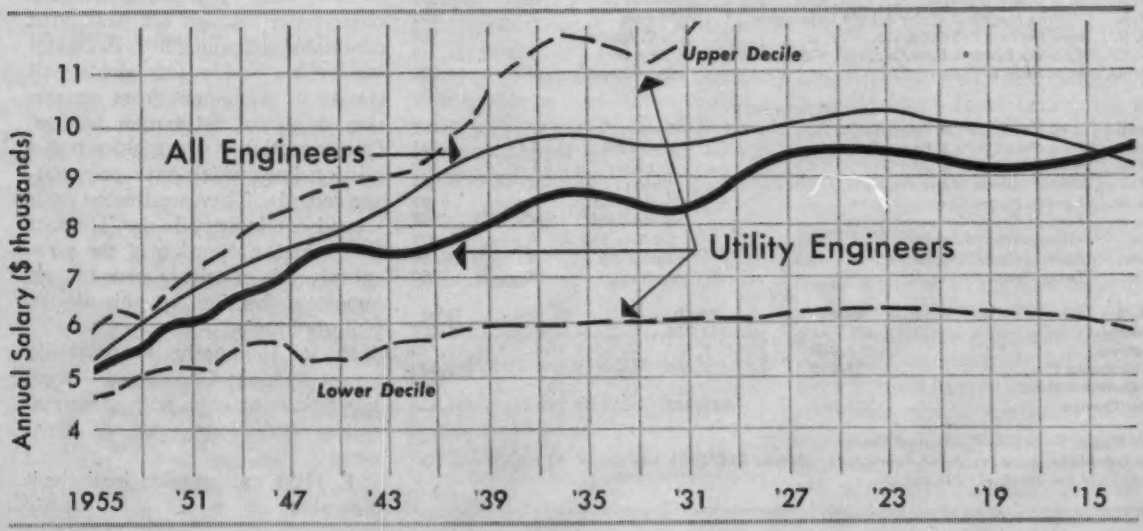
Recruiting engineering graduates seems to require a slightly different approach. Men under 25 years of age do not consider "starting salary" or "regular salary increases" as important as they do other factors. The primary factor influencing this group is "potential growth of company" and the second factor is "challenging opportunity." "Starting salary" ranks seventh with them and "regular salary increases" is ninth in order of importance.

The chart below represents some of the pertinent results of a professional income survey recently published by the Engineers Joint Council. It is based on salary data collected on 107,832 engineers in all of industry, of which 3,931 were in the public utilities, and sanitary services field.

Utility Starting Salaries: $400

Starting salaries for public utility and sanitary engineers, the survey showed, ranges between $325 and $435 per month with a median of $400. This median starting salary is above that for engineers in government and the telecommunications services, and somewhat below that for engineers in most other fields.

The curves below represent the 1956 median salaries of all engineers and for public utility engineers by year of entry into their chosen fields. To strengthen any appeal to engineers to come into the utility field, it should be emphasized that the upper 10% of the engineers draw salaries 30 to 70% above the median.



Pool Cuts Sizes of Generating Units

PEA groups at Philadelphia learn of benefits from Southwest Power Pool. Intertie enables companies to profit by installing larger generators

Installing generating units sized at 20-30% of the individual system load has been possible in the Southwest by the interconnection of utility systems in the Southwest Power Pool. This allows the interconnected utilities to take advantage of lower per kw costs of large machines which would not be possible were the systems operated separately.

System planners and operators heard P. L. Gunn, Southwestern Gas & Electric Co, explain this and other advantages of the pool arrangement at joint meeting of the Pennsylvania Electric Association's System Planning and Systems Operation Committees Feb. 14-15 in Philadelphia, Pa.

Gunn said that the power pool grew out of a wartime arrangement necessitated by a power shortage created by the increased industrial activity in the area. The interconnection is so arranged that each utility must have a minimum reserve of 12% of its capacity and maintain a 5% minimum spinning reserve. Discussion following the paper brought out that some participants carry a 7-14% spinning reserve. This increase above the minimum is considered necessary because transmission ties into operating areas are not always large enough to supply the total required power in an emergency.

The planners were told that they must eventually provide operators with reliable systems two and three times the size of today's. In calling this to the attetion of the meeting, J. A. Tenbrook, Philadelphia Electric Co indicated that electricity is the only energy that theoretically at least can be used to supply all energy needs, e. g., heat, light, and mobile or stationary power. He pointed out that the electric utilities are the only ones who have the "package" to deliver atomic energy. And although electricity now only accounts for 3.5% of the energy developed (gas industry about 3.5%, automobiles about 17%) its potential is tremendous because changes in fuel cost may at some time make electricity attractive for universal space heating, the area of largest energy consumption. If electric house heating continues to grow at its present rate, the importance of electricity as a source of energy will grow with it.

Fast Clearing Needed

Planning for such future loads requires a specific program of equipment additions, according to H. B. Wood, Duquesne Light Co. Wood said that the future system will face the problem of reduced system impedance resulting in high breaker duty and more widespread effect of a disturbance. He said that selection of future transmission voltage may be a direct function of proposed generator size, and low inertia generators will make rapid clearing of faults imperative.

The general premise of planning at Long Island Lighting Co is "first contingency" design for peak load conditions, according to J. L. Davidson. This holds for almost all classes of equipment from generation down to distribution feeders. One exception is some older transmission lines which have poor outage records. They are treated on a second contingency basis. The fact that a high proportion of the present plant is relatively new has an important bearing on this design philosophy.

R. R. Hemmerly, Pennsylvania Power & Light Co, offered several suggestions to cope with abnormal system conditions. Among them were:

1. Have an adequate load shedding plan.

FPC Reports 769.6 Mw Net Capacity Gain

PLANT ADDITIONS DURING JANUARY

State	Utility	Plant	Fuel	Capacity
Calif.	Imperial Irrigation District	Pilot Knob	H	33,000
Calif.	Southern California Edison Co	Alamitos	S	163,200
Del.	Dover Municipal Power Plant	Dover	S	5,000
Iowa	Seymour Municipal Light & Water Works	Seymour	IC	588
Mich.	Lowell Municipal Utilities	Lowell	IC	1,136
Mo.	Rich Hill Water, Light & Power Co	Rich Hill	IC	350
Neb.	U. S. District Engineer	Gavins Pt	H	33,333
Neb.	Wayne Municipal Water & Light Department	Wayne	IC	2,000
N. H.	New England Power Co	S. C. Moore	H	140,400
N. C.	Carolina Power & Light Co	Cape Fear	S	125,000
Wash.	U. S. Army Engineers	Chief Joseph	H	64,000
	RETIREMENTS			
Iowa	Iowa Electric Light & Power Co	Boone	S	2,000
Iowa	Iowa Electric Light & Power Co	Iowa Falls	S	1,125
Minn.	Minnesota Power & Light Co	Virginia	S	4,750
Mo.	Albany Light & Water Dept	Albany	IC	200
N. M.	Farmers Electric Cooperative, Inc	Santa Rosa	H	80
N. M.	Farmers Electric Cooperative, Inc	Santa Rosa	IC	998
Pa.	Metropolitan Edison Co	So. Side Easton	H	1,000
Tex.	Southwestern Public Service	Panhandle	IC	184
Tex.	Texas Electric Service Co	Andrews	IC	200

U. S.	Hydro	Steam	IC	Total
Added	270,733	293,200	4,074	568,007
Retired	1,080	7,875	1,798	10,753
Adjustments Plus	33,865	170,042	8,673	212,580
Adjustments Minus	.....	.....	200	200
Net Change	303,518	455,367	10,749	769,634

H—Hydro, S—Steam, IC—Internal Combustion

United States Capacity as of February 1—Hydro, 25,870,502 kw; Steam, 92,908,857 kw; IC, 2,415,524 kw; Total, 121,204,883 kw.

2. Have some type of automatic relief from transmission overloading.

3. Have system telemetering so that data will be available to enable speedy evaluation of situation.

4. Have reliable communications.

5. Be familiar with the physical equipment on the system—its capabilities and limitations.

Northwest's Power Picture Now Bright through '65

Power to meet all firm and interruptible loads in Oregon, Washington, northern Idaho and western Montana is in sight through 1965 under median water conditions, despite heavy increases in power loads according to the Bonneville Power Administration's latest analysis of the power picture.

Biggest factor in the improved situation is a sixfold increase in currently scheduled nonfederal generation compared to a year ago and new generation from federal plants under construction.

"Cooperation of Pacific Northwest utilities and the federal government in moving to meet the region's power needs has already rolled back anticipated 1961-62 power deficits three years to 1964-65, under critical water conditions," Administrator William A. Pearl said.

CP&L Seeks OK To Buy County Utility

Carolina Power & Light Co of Raleigh, N. C., has asked the North Carolina State Utilities Commission for its permission to purchase facilities of the Rocky River Power & Light Co of Chatham County, N. C., for $36,297.32.

Rocky River P&L, located in Oakland Township of Chatham County, has 18 miles of line serving 75 customers. It told the Commission it has been operating at a loss and does not have necessary funds to modernize and expand its system to provide needed service in the area. It said its present facilities are old and in need of constant maintenance.

Pilot-Wire Range Extended

PEA Relay Committee is told how Duquesne Light research enabled it to operate system beyond manufacturers' limits

Duquesne Light Co has extended successfully the operating range of pilot-wire protection for 69 and 138-kv transmission lines. This was reported Feb. 28 by C. M. Jackson and W. J. Callin at a Pittsburgh meeting of Pennsylvania Electric Association's Relay Committee.

After extensive laboratory and field tests, Duquesne claims that both HCB and CPD pilot-wire equipment can be made to function properly on telephone pairs whose constants exceed the manufacturer's published limits of resistance and capacitance.

Pilot Wire Suitable

These limiting telephone circuit constants have become more and more of a problem in applying pilot-wire protection to Duquesne's 69 and 138-kv systems. The problem arises from longer telephone lines between terminals rather than longer transmission lines.

Years ago the company found that its compact metropolitan power system, together with its own extensive telephone plant, was suited ideally to pilot-wire protection. But over the years Duquesne faced the growing problem of providing high-speed fault clearing of its expanding transmission system by means of pilot-wire protection that had a limited operating range.

These limits were established by the manufacturers of HCB and CPD equipment. They designed their pilot-wire relays to operate with telephone pairs having a maximum loop resistance of 2,000 ohm and a maximum capacitance of 1.5 microfarad.

What the Tests Revealed

Jackson and Callin drew these conclusions from their tests:

- Generally a 15 to 20% improvement in relay sensitivity can be obtained by using tuning reactors across each end of the pair to neutralize excessive pair capacitance.
- With HCB equipment, 4/1 rather than 6/1 insulating transformers should be used on long telephone circuits of 19-gauge wire or larger. On long pairs HCB relays with contact backstops should be used.
- With CPD equipment, in addition to use of tuning reactors, the insulating transformer ratio must be changed to decrease the apparent line capacitance. This provides proper relay operation on extremely long pairs.

Leased Lines a Problem

Applying protective equipment on leased telephone lines can be another problem. F. H. Travers discussed Philadelphia Electric Co's difficulties in applying tone-transfer trip equipment on leased telephone lines to an overall protective relaying scheme.

The company set high standards of performance: 10-millisec maximum operating time, 100% reliability, and 100% security against incorrect operations caused by false signals.

Urges Cooperation

Leased telephone wires impose two restrictions on terminal equipment: (1) the frequency band used must be within limits acceptable to the telephone plant, and (2) applied voltages must not exceed established maximum values. Consequently, because some microwave channels accept a much wider frequency band than is accepted by telephone lines, terminal equipment designed for microwave may not be completely satisfactory on wire lines.

Travers emphasized that equipment manufacturers and telephone companies should cooperate in assuring that equipment is designed to perform adequately on the grades of telephone facilities generally available.

Meetings Calendar

A calendar of coming meetings is carried every week in the back part of the book (p 145). In coming issues see Contents Page (p 3).

Development Course Makes Supervisors

- Niagara Mohawk Power Corp program enables it to promote from within
- Two-part course requires over two years of study in theory and practice
- Trainees are selected in time to fill openings made by promotions and retirements

FRANK M. OSTA, Director of Employee Relations, Niagara Mohawk Power Corp, Syracuse, N. Y.

The problem of securing an adequate supply of supervisory employees, a problem common to all industry, continues to grow in magnitude and importance.

Niagara Mohawk Power Corp (Syracuse, N. Y.), like many other companies, has long had a policy and followed the practice of promoting from within to fill supervisory positions.

Sound, careful employment practices, together with a series of mergers and consolidations of smaller companies, prior to NM's formation in January 1950, provided an adequate supply of trained and experienced employees to fill such needs.

As time went on, however, it became evident that the cumulative effect of inherently restrictive provisions of the labor agreement, with its specialized job specifications and well-defined work or occupational groups, tended to reduce the necessary supply of fully trained employees for such positions. And continuing expansion and rapidly changing techniques were creating an ever-increasing need.

To supply this need and preserve the policy and practice of promoting from within, an effective, formalized plan had to be adopted.

In 1952 the employee relations department, with representatives of major departments, met to consider the problem. The result was our Auxiliary Supervisory Development Course (ASDC) which was launched July 1, 1953.

Course Serves All Departments

ASDC is designed to serve all NM departments. Administered by the employee relations department, it consists of two basic parts. Part I requires 58 weeks and is common to all trainees. It provides a specific curriculum that affords experience of varying degrees in all departments. Part II, which requires a minimum of one year and a maximum of two years, provides a more flexible curriculum that varies with requirements of the department to which trainees are assigned.

The curriculum for Part I requires all trainees to acquire experience in all departments to the following extent:

Accounting	5 weeks
Advertising & Publicity	1 week
Commercial	14 weeks
Employee Relations	2 weeks
Engineering	8 weeks
Law	1 week
Operating	22 weeks
Purchasing	1 week
Rate	1 week
Review	1 week
Vacation	2 weeks

Curriculum for Part II provides for certain specific assignments which vary with the department involved. It is more flexible to serve better the trainee and the department by taking advantage of projects occurring infrequently.

All trainees start in the employee relations department. Here they receive intensive orientation, including lectures and seminar discussions of history; organization; departments and functions; area served; service rendered; and public, human, and labor relations.

Also included during this period is a meeting with the top management. Trainees are impressed with the idea that the entire course is intended to develop them as supervisors, and the particular tech-

niques of supervision, as such, are discussed.

Upon completion of this two-week period, trainees are assigned to other departments and are required to file with employee relations periodic reports of their activities. These are submitted at least biweekly during the first part of the course and less frequently during the second part. Supervisors, under whose guidance the trainees work, also submit progress reports at like frequency.

Problems Aired Off the Record

After trainees complete their original two weeks in employee relations, they are brought in frequently during the remainder of their training for informal discussions, usually with the personnel manager. On these occasions their reports are reviewed, and a general off-the-record discussion is held on any problems they might have.

Trainees are urged to offer any criticism or comments regarding the course. Formal reports are routed to department heads for comments. The personnel manager keeps in constant contact with department heads regarding the trainees' progress.

During the second year, the trainee is usually assigned to a department—or sub-section of a department—for intensive, specialized training in one or more phases of the company's operations. Here he works on specially assigned tasks, either on individual assignment or as a member of a group. He is required to exercise ingenuity and judgment. His performance during this phase is especially significant as to his ultimate assignment.

Unusual Jobs Studied

He may spend as much as six months or more on a particular assignment. If some unusual activity occurs, such as the building of a high voltage transmission line, he may be temporarily assigned to work on this because of its somewhat infrequent occurrence. This is also true during the first year of the course.

In his final year he may actually be assigned to a training supervision job; that is, a job established simply for the purpose of giving him experience in supervising a section or work group. On other occasions a trainee has been given complete responsibility to plan, develop, and execute a particular project which may or may not include the supervision of a small group of other employees.

Another basic consideration is that upon completion of the course the trainee is moved into the first line of supervision or a comparable staff position. It is definitely not a management training program. In most cases the particular spot that the trainee is to fill was determined at the time the original quota, of which the trainee is a part, was determined.

The course is not intended to build up a pool of trained graduates for whom no positions are available. Therefore, the trainee, almost invariably, knows sometime during the last year of training where he is ultimately going to be assigned.

Self-Help Sustains Morale

He has the chance to prepare himself further in whatever manner he sees fit for actually taking over this job. We believe this is an important morale-sustaining factor, for the trainee has no doubt as to whether his training and experience are going to be put to work.

In early December of each year a meeting is held with representatives of all departments to develop the quota of trainees for the following year. Over-all operation of the course and progress of trainees are reviewed.

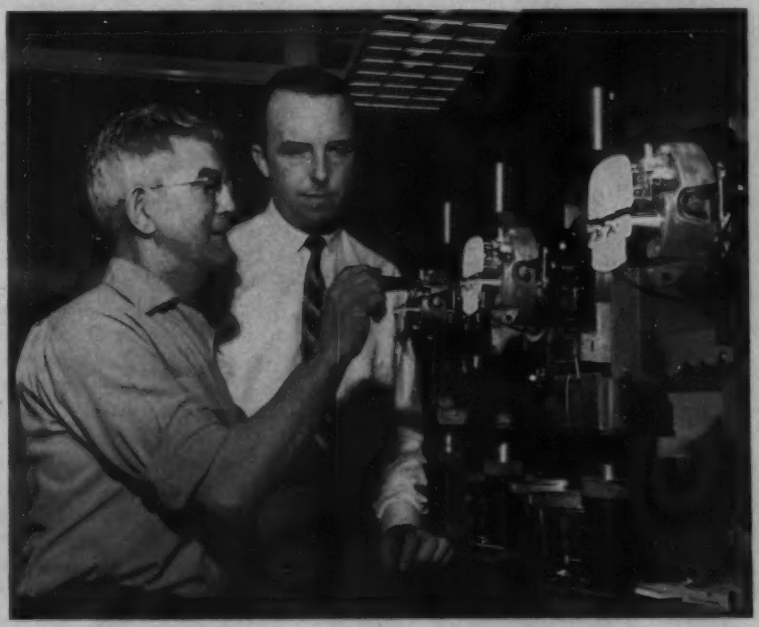
The salary schedule is also reviewed and, if necessary, adjusted to conform with going rates for college graduates.

Quotas Geared to Needs

Chief purpose of the yearly meeting, however, is to develop the quota by departments for the following year.

Each system department head has previously canvassed his division department heads as to their needs. It is at this point that adequacy of normal promotional procedures is critically analyzed. Any request for a trainee must be supported by evidence that there is no employee available who can be expected to fill the vacancy.

To assist in this determination, a list of prospective retirements of monthly paid employees is furnished to department heads and is kept current by the employee relations department. An experience factor for normal deaths and turn-over is considered. Proposed moves to fill a particular vacancy are reviewed until the chain reaches the first level



TRAINING IN ALL DEPARTMENTS takes 56 weeks, preceded by a two-week orientation. Trainees get specific curriculum affording varying degrees of experience

DISTRIBUTION—Maintenance

EMPLOYEE'S QUALIFICATIONS for course are reviewed by division personnel manager. A panel of department heads then decides on final selection of applicants

of supervision. When it is determined that there is no one available to fill the vacancy, a request for a trainee may be submitted by the department head.

For example, assume that a superintendent is retiring in 1960. He is to be replaced by the assistant superintendent who, in turn, will probably be replaced by the general foreman. Under the foreman are three operating supervisors, one of whom will probably be made general foreman. However, none of the crewmen appears to have potential and capabilities for taking over as supervisor. No one in other sections of the department is available and capable. So, a request for a trainee to complete the course in 1960 is made in 1957.

All Employees Notified

After the quota by departments is developed and checked against an over-all maximum provided for by the labor agreement, bulletin-board announcements to all employees are posted in January. This provides 15 days for any interested employee, who deems himself qualified, to apply to the personnel manager for consideration.

General qualifications for consideration are these: The candidate must be between the ages of 21 and 40 and must be a college graduate or the equivalent. The equivalent may consist of various factors of formal education including partial college training or technical schooling plus company experience. If these two basic requirements are met, the application entitles him to an interview with the personnel manager who interviews all qualified candidates.

Annually, and prior to the bulletin-board notices, union representatives are notified as to the over-all quota and furnished with a breakdown by departments.

Panel, Personnel Manager Select

Candidates with a particular aptitude and necessary educational background are brought to the headquarters office for further interview by the division panel which consists of division department heads. This way the department head who made the request may interview not only the man who will be selected for his own department but the other candidates as well. This panel, with the personnel manager, makes the final selection. The administrative vice president approves actual appointments to the course.

Our experience in finding qualified employees since launching the course in 1953 has been most satisfactory. In 1956 in only one of our three operating divisions was it necessary to hire from outside the company. This was done on a selected basis, not through campus recruiting.

No Candidate Shortage Expected

Will it be necessary to hire almost all of our candidates from outside after the first few years? Not necessarily.

In the first place, some departments may not submit a request every year; particular talents and training may be required only every two, three, or four years. Secondly, once the trend and pattern of requirements are established, normal employment during the year can be geared to provide qualified candidates with one or more years experience.

And finally, many NM employees are bettering themselves through education courses and will have required educational training later.

As a matter of fact, establishment of the Auxiliary Supervisory Development Course has acted as an encouraging stimulus to employees to procure the education and training necessary to meet Niagara Mohawk's requirements.

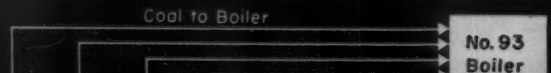
Older Heads Get Help Too

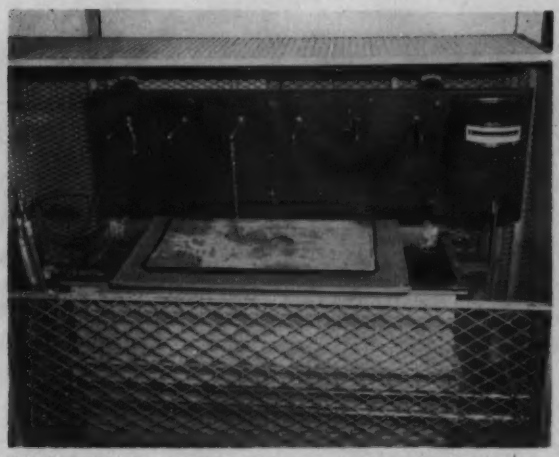
Although the course is too new to draw firm conclusions, we believe it has proved itself worth while, both to the company and individual employees selected. One of the most critical comments to come forth has been the observation by older supervisors, in many cases the ones providing the training, that trainees know more about company operations and supervision techniques than they do.

This, of course, has pointed up another area where much work is needed. A Supervisory Development Project to supply this need began the first of this year.

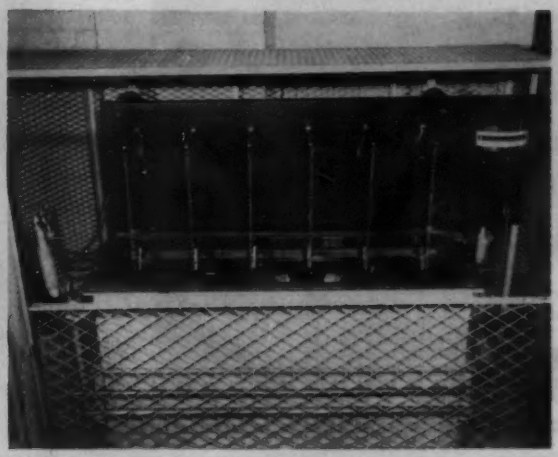
Since the ASDC course started in 1953, 40 trainees have enrolled and 12 have "graduated." Seven more are due to "graduate" this year. Only one man failed to maintain satisfactory progress.

We believe the course will continue to play an important part in the development and maintenance of our supervisory forces for many years to come.





SPECIAL SET for testing rubber protective equipment can subject one rubber blanket to specified voltage at a time



SIX GLOVES are given hi-pot test in the tank at one time, and leakage current can be read for each unit separately

Repaired Rubber Items Pass Test

EARLE E. DIEHL, Superintendent, Meter Department,
Toledo Edison Co, Toledo, Ohio

Rubber gloves, sleeves, and blankets, damaged by screwdrivers, climbing spurs, wire, skinning knives, or other tools, are repaired by Toledo Edison Co whenever practicable.

When such rubber goods have been patched by the tire repair man, they are tested for dielectric strength in the company's testing laboratory.

Repairs, however, are made only upon the recommendation of a tester. Patches are in two sizes, 1½-in. and 2-in. dia. When a piece of protective equipment has a damaged area that cannot be patched satisfactorily with a 2-in. patch, such equipment is discarded.

Meet Voltage Specifications

The cold-patch method is used. This is a self-vulcanizing process completed by chemical action. The damaged section is roughened, vulcanizing fluid is applied, and the patch is pressed firmly in place. It becomes vulcanized firmly through chemical action.

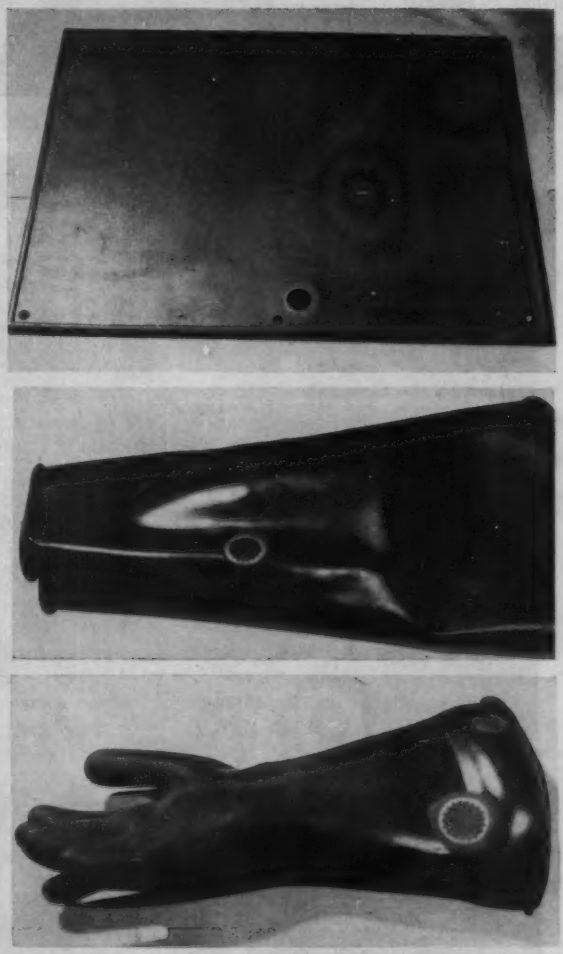
Patching costs average $1.10 each for gloves and sleeves, and $2.10 per patch for blankets.

Patched rubber goods are subjected in the laboratory to the same tests applied to new equipment. Gloves are tested at 10,000 v for 3 min. and at 18,000 v for 1 min. Sleeves are tested at 10,000 v for 1 min, and blankets for 3 min.

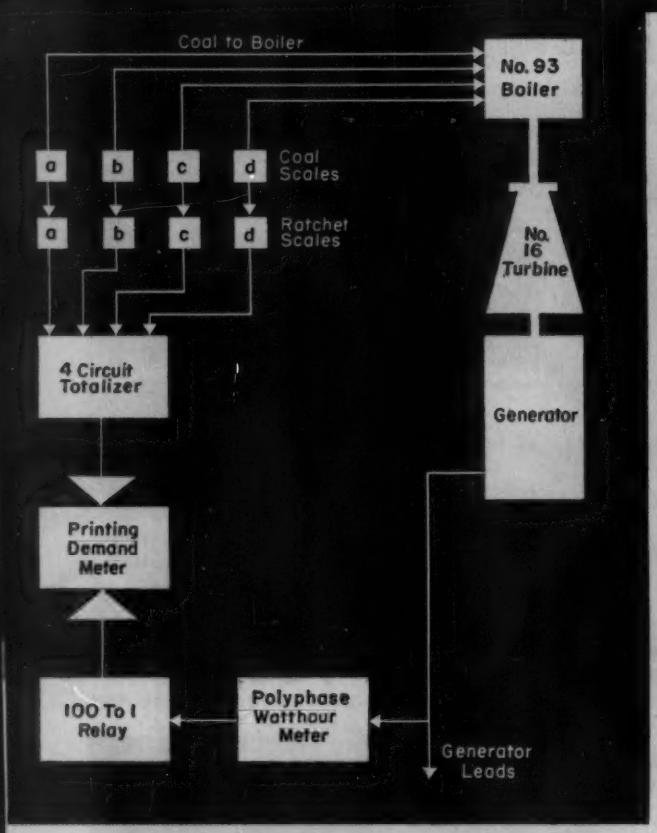
Workmen Accept Repaired Items

The high-potential test can accommodate six gloves, four sleeves, or one blanket at a time. Voltage can be varied from 0 to 35,000 v by means of the variable-controlled transformer.

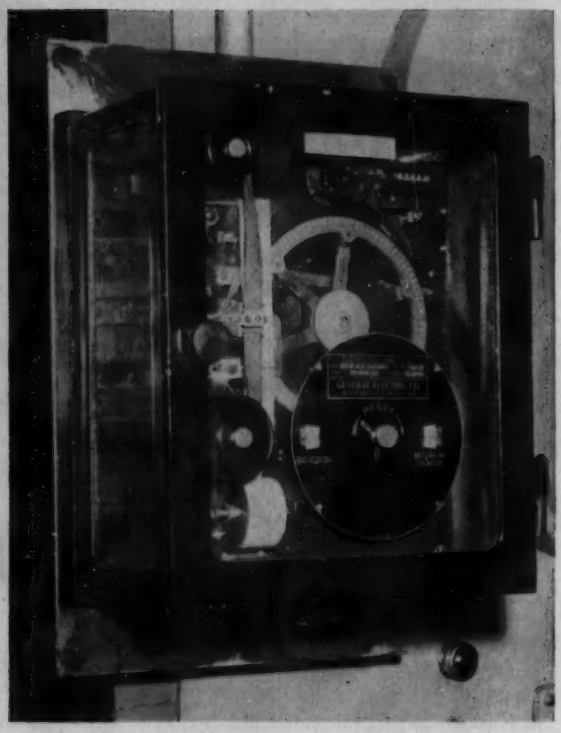
Workmen accept the repaired rubber protective equipment with the same confidence they have in new rubber goods.



REPAIRS by vulcanizing can be made on blankets, sleeves, and gloves, all of which must pass high-potential tests



Coal flow and kwhr readings . . .



. . . are compared and recorded as . . .

Computer Tapes Lb Coal / Kwhr

ARMAND BUR, Engineer, Product Engineering Dept, Cleveland Electric Illuminating Co, Cleveland, O.

Continuous, timed records of lb of coal per kwhr quickly give the results engineer information he needs for operations and load dispatching. Such records are provided by a meter developed from standard instrument components. This "coal factor" meter eliminates the need for periodic calculations from coal scale and kwhr output. Changes in fuel quality will vary its readings somewhat but the ultimate goal of a meter to compute directly the cost per kwhr must be left for later consideration pending development of a device to measure coal's Btu instantaneously.

A "coal factor" meter is operating on Cleveland Electric's Lake Shore No. 16 turbine. This location was selected because the coal scales were near the control room and No. 16 has its own boiler, a 680,000 lb per hr unit delivering steam at 850 psig and 950 F. The turbine is a 75,000-kw machine. Coal scales are of the batch type with a nominal 400 lb dump.

Preliminary analysis indicated the logical approach to be totalizing the coal quantity from the four scales and dividing it by the kwhr generated. It had these discernible difficulties:

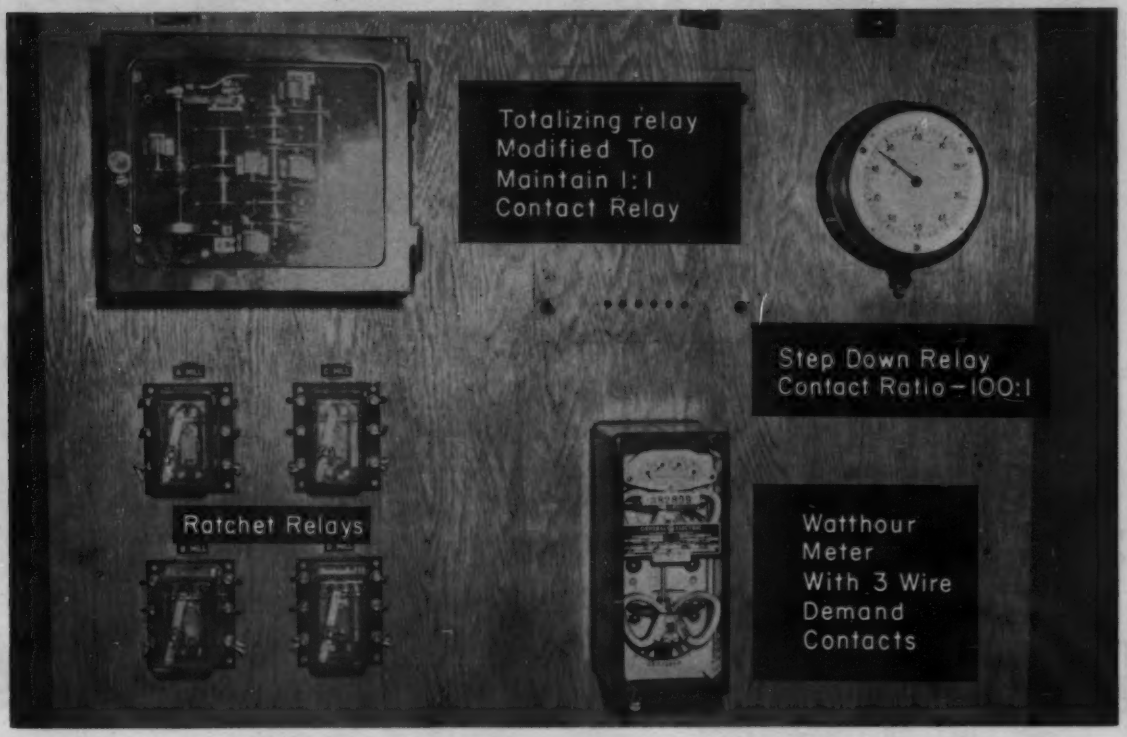
- The 400-lb incremental impulses for coal are irregular.
- Impulses could occur simultaneously from four scales to complicate the count.
- A large number of incremental impulses is required to reduce variation error.
- Coal and electrical components must be coordinated for computation.
- A timed printing mechanism would be required.

The first meter installed computed the kwhr generated per lb of coal and gave a printed coal factor on a timed 1-in. tape for every 25 dumps of coal. At 80,000 kw output these readings appeared approx. every 8 min. The frequency of the computations was dependent on turbine load. Variation of a single dump during the interval introduced an error of ± 4%. But the system would have been more accurate with coal weighed in smaller batches or on a continuous type scale.

Final Design Based on Kwhr

Subsequent modification of this installation made it compute the coal factor directly at base intervals in which 40,000 kwhr have been generated.

Comparison of the two methods reveals the inherently greater accuracy of a 40,000-kwhr base over the 25-dump one. In the first installation each of the four coal scales sent an impulse (through individual relays) on the completion of each


Totalizing relay Modified To Maintain 1:1 Contact Relay
Step Down Relay Contact Ratio—100:1
Ratchet Relays
Watthour Meter With 3 Wire Demand Contacts

Continuous record of units coal factor is provided on 40,000-kwhr output base

dump to a 4-circuit totalizer. These dump-records were totalized and stored until a total of 25 had been accumulated. A pulse to print was then sent to a printing demand meter which measured power output simultaneously. Thus,

$$\text{kwhr per lb of coal} = \frac{\text{kwhr}}{25 \times 400}$$

where 25 and 400 remain constant so that the kwhr figure provides the significant figures.

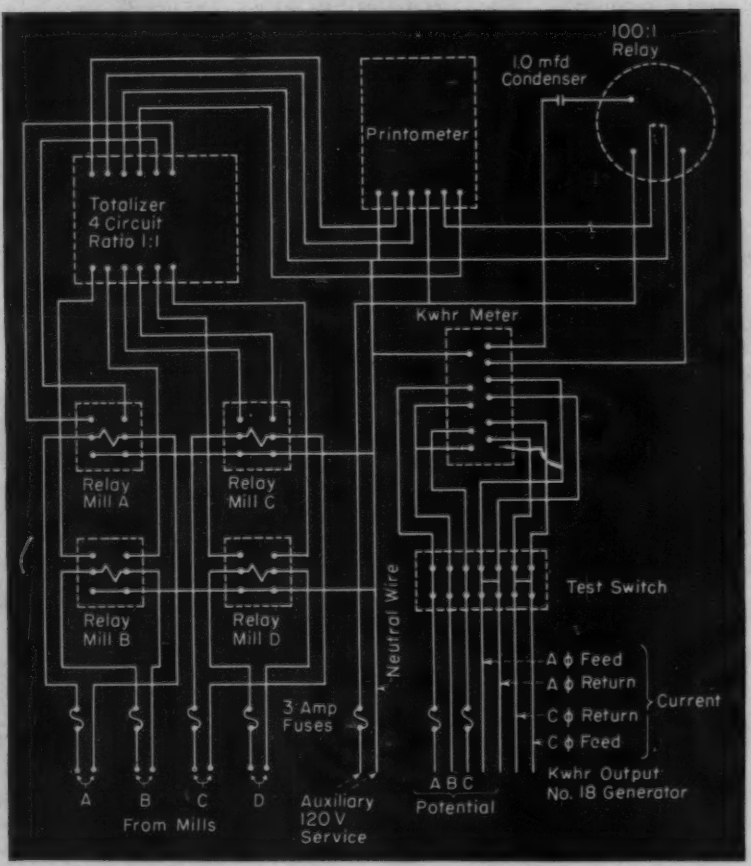
In the second installation the coal scales deliver impulses to the totalizer which relays its count to the printing demand meter. Again, generator output is measured simultaneously for an interval of 40,000 kwhr and a print of the number of coal dumps is made. The coal factor becomes

$$\text{lb coal per kwhr} = \frac{\text{No. dumps} \times 400}{40{,}000 \text{ kwhr}}$$

Thus the number of dumps becomes the sole significant variable in this improved system.

The mathematical function was arranged for easy application to a straight counting cycle by conversion to a decimal fraction so that

(Continued on page 156)



THREE-PIECE TOOL is assembled for simulated field use. Components are (1) pivoted support arm, (2) removable guide chute, and (3) pulling and holding guide. The conduit between (1) and (3) may be of any specified length

DISTRIBUTION
Construction

Underground Cable-Pulling Rig

R. DAVID BUTT, Miami Area Engineering, and
JOHN S. FLEMING, Underground Engineering, Florida Power & Light Co, Miami, Fla.

Excessive tension in pulling cables becomes a thing of the past with the 3-piece tool used by the Florida Power & Light Co, and built by Cable Equipment Co. No longer does tension at the riser ell limit the length of duct runs. Total pulling tension alone is the deciding factor.

With this rig, cable is fed directly from the reel in alignment with the conduit which will hold it on the pole. When the required length has been pulled, the conduit with the cable is lifted into vertical position, and the tool components removed.

Simple Assembly Has Only Three Parts

There are only three parts to the assembly, the pivoted support identified as (1) in the illustration above, the removable chute (2) whose arc is precisely that of the pivot member, and the terminal guide (3) which serves the dual function of supporting one end of the conduit during installation and threading the cable between reel and conduit.

While the conduit section between (2) and (3) serves as a pulling tube, this function is wholly incidental to raising the cable-conduit assembly at the pole. Weight of the assembly averages 1,000 lb.

When the pull has been completed and chute (2) removed, the conduit is raised into position with a winch line passing through a snatch block attached to the pole a few feet above where the conduit will terminate. As the conduit is raised, the extra cable in the arc pushes itself through the conduit and is supported by pulling guide (3). Such slack is taken into account in estimating the final footage in terminating the cable. Guide (3) has an arc such that the minimum radius of bend of large cables is intact.

Practice calls for three guy lines during elevation,

CABLE, here ready to be pulled, has been aligned with the conduit, and the work crew is preparing to pull it through

REMOVABLE CHUTE guides the cable as it is pulled smoothly in an arc to the riser ell. Duct runs can be any length

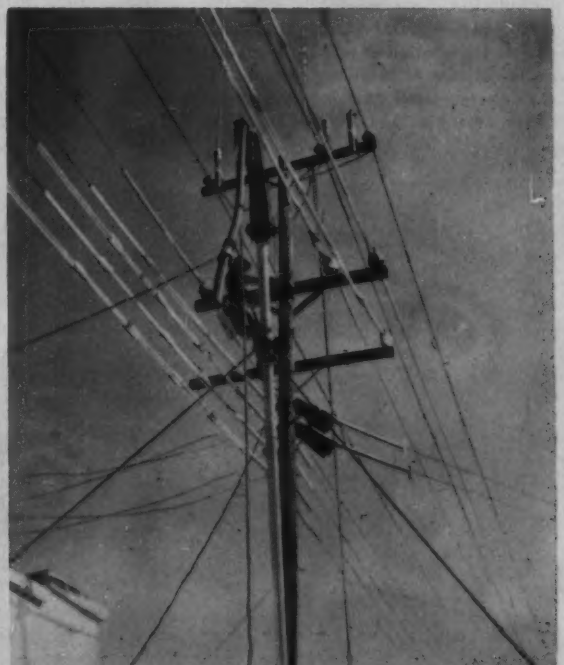
LUBRICATION is applied at the point where the cable is trained into the conduit. Job is usually done by hand

Relieves Tension at Riser Poles

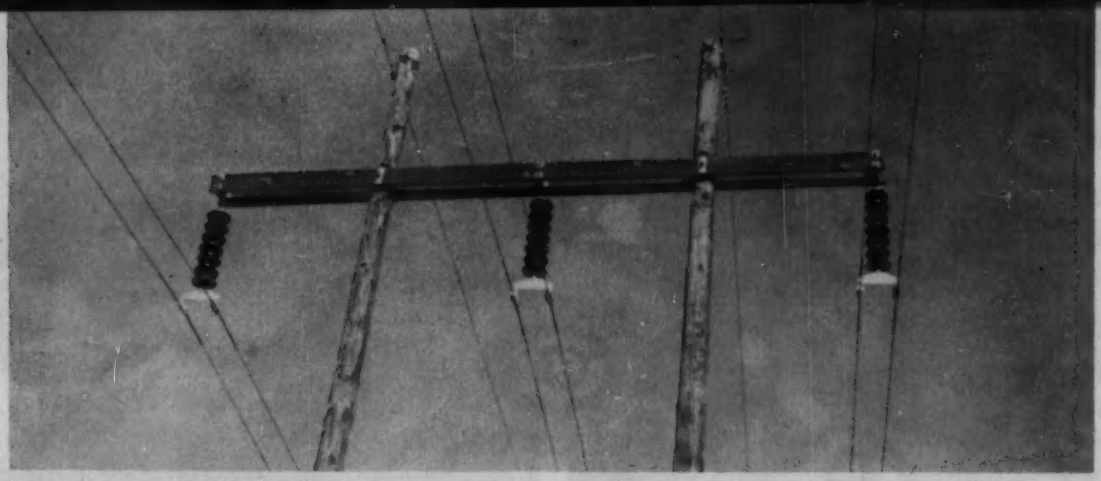
but the assembly is so stable that this becomes a precautionary measure. Two of the lines are attached to upper end of conduit, the third to the protruding cable.

With the conduit in position, the slack cable is tied off to the pothead, and the guide released and lowered to the ground. The chain grips on pivot (1) are then loosened to permit the conduit to slip down to the coupling installed initially on the riser ell.

PULL COMPLETED, the guide chute is removed, and the cable and conduit are pivoted into position near the line pole



ASSEMBLED CONDUIT AND CABLE are raised between live conductors which are covered with the usual rubber line hose



Doubles 115-Kv Line Conductoring

TRANSMISSION
Design

Bureau of Reclamation, by adding 4/0 ACSR conductor, increases circuit's capacity to 40 Mw in 72-mile section

Double-conductoring has been selected by the Bureau of Reclamation as the most economical way of increasing the capacity of its Elephant Butte-Socorro, 72-mile section of 115 kv, single 4/0 ACSR line. With double-conductoring, the line will carry 40 Mw. Special mid-span spacers, duplex spacer plates at the bottom of the insulator strings, and the use of hydraulic booms with platforms for workers are features of the changeover.

HYDRAULIC BOOM AND PLATFORM enable installation of mid-span spacers on conductors 67 ft above the ground. Outriggers permit 15-deg sideswing of the boom. Platform acts as T-square

It was estimated that this portion of the Bureau's 212-mile Albuquerque-Las Cruces single-circuit transmission would become a limiting factor in the New Mexico Power Pool by late April or May of this year, preventing economical interchange and reasonable voltage gradients. The new interchange capability of the circuit is expected to meet system requirements until 1960-62.

The Elephant Butte-Socorro section is a wood H-frame design, originally built in 1948. It now carries three 4/0 ACSR conductors with a flat 12-ft spacing, with two ⅜-in. steel-strand overhead ground wires. It was designed for NESC medium loading.

The new duplex conductor design provides for no change in phase spacing. The two conductors for each phase will be 15 in. apart. They will hang in a flat configuration from suspension insulators, with appropriate variations at angle structures. The new design will lower effective reactance and resistance from 0.854 to 0.606 ohm and from 0.592 to 0.296 ohm per phase per mile at 50C, respectively.

Procedure for duplexing the line conductor was evolved by Bureau engineers. Existing conductor is unclipped, lifted from the clamps, and stripped of armor rods and vibration dampers. Hardware is removed from insulator string, and a special duplex spacer plate is attached to the bottom disk by a socket clevis. Stringing blocks for both old and new conductors are hung from the spacer plate, and the old conductor is on its sheaves.

New conductor is placed along the ground from traveling reels, and is lifted to the vacant stringing blocks. Bureau specifications call for both old and new conductors to be placed under prestress tension of 4,100 lb within 18 hr of being placed in the blocks. Prestress tension is held for 2 hr to equalize ultimate differential tension and sag between like-phase conductors. Both cables are sagged to a ruling span of 700 ft, except for special spans. Conductors are allowed to equalize in the sheaves for at least 2 hr longer. Prestressing tension is checked by dynamometer as required by Bureau specifications. Sagging is checked with a pole-mounted transit.

Clamp hardware is attached to the duplex spacers, armor rods are added, and conductors are clipped in. Vibration dampers are replaced and added as required on dead-end spans.

For the line's longest span—1,940 ft over Nogal Canyon—two insulator strings with a double yoke will be installed for each phase. Completely new cable will be installed to maintain rigid control of sag differential. Two other long spans will have double insulator strings.

Prevention of strand abrasion caused by swinging contact between like-phase conductors has been a major problem in recent duplex-conductor designs. Bureau engineers call for spacers consisting of two 31-in. long armor rod sets, over which are placed four special U-shaped preformed rods. Two rods are used each way to form an oval-oblong unit which is adequately fastened to the conductors and yet provides needed flexibility. Spacers are equidistant in each span, maximum separation limited to 200 ft.

Special Boom Used

The contractor uses a special truck-mounted hydraulic boom and platform, with an overall possible reach of about 67 ft, to install spacers. On canyon crossings too high for this vehicle, conductors will be lowered after being sagged to apply spacers. As an alternative, a modified "bosun's chair" suspended from the overhead ground wires may be used. Spacers normally are not applied until the line is clipped in.

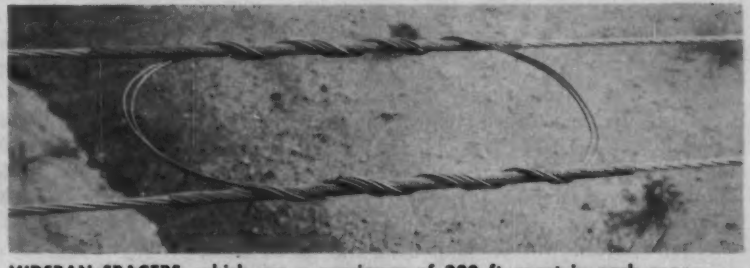
New conductor is furnished in reels of 4,100-4,200 ft. The contractor has been sagging at least two-reel lengths where practicable and expects to prestress four-reel lengths at one pull on much of the line. By utilizing six dynamometers, one can be set on each conductor during a prestress pull, greatly simplifying the checking of proper tension during the pull.

Bureau specifications do not permit pulling against suspension structures when prestressing the conductors between dead-ends. Temporary anchors in the ground are used.

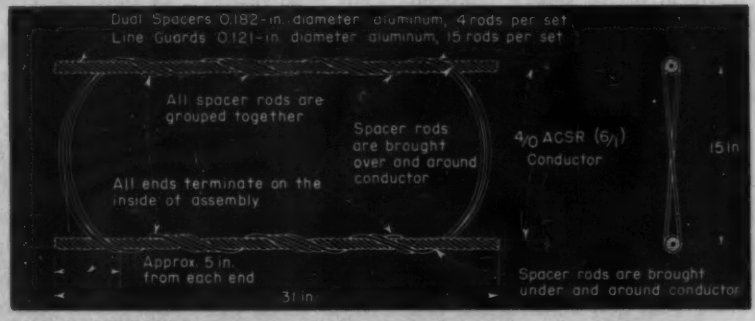
All structure guys are doubled for strength against doubled conductor tension. Exisiting guy wire and clamps are replaced. Guy anchor rods and anchors are reused. To maintain standard clearances, some existing X-braces are lowered. Conductors on 3-pole angle structures are raised or lowered for proper clearance to guys.

PREFORMED LINE GUARDS are installed first, and these are followed by . . .

TWO PREFORMED RODS in each direction are used to provide . . .



MIDSPAN SPACERS, which are a maximum of 200 ft apart in each span


Dual Spacers 0.182-in. diameter aluminum, 4 rods per set
Line Guards 0.121-in. diameter aluminum, 15 rods per set
All spacer rods are grouped together
Spacer rods are brought over and around conductor
4/0 ACSR (6/1) Conductor
15 in
All ends terminate on the inside of assembly
Approx. 5 in. from each end
31 in
Spacer rods are brought under and around conductor

DUAL SPACER RODS produce a unit fastened adequately to the duplex conductors yet providing needed flexibility to absorb any changes in conductor tension

Flexible Plan

- Reorganized Dallas Power & Light Co program is based on preventive approach
- Preliminary study shows constant work throughout year reduces costs, makes more efficient use of manpower, betters service

TREE-TRIMMING PROGRAM aims at a complete system coverage each year. Its procedures have been mechanized

L. H. CARDWELL, Operating Division Head, Distribution Department, Dallas Power & Light Co, Dallas, Texas

Rather than adhere closely to prescheduled and unnecessarily frequent distribution maintenance routines, Dallas Power & Light Co is considering further extension of a more flexible plan. This is based upon inspection and test of facilities.

Preliminary study shows benefits in the minimization of required teardowns of equipment and in the more effective use of manpower, both gained without impairment of the service rendered. Thus maintenance, instead of being a slack-interval, fill-in job, is being spread more uniformly throughout the year.

A tentative maintenance plan, based on re-examination of past procedures, has been put into operation. Frequent field inspections determine the need for maintenance. The inspection group issues written requests that specific maintenance jobs be carried out. After the work has been completed, crews report this on a part of the request form. Records are kept of performance and the results of inspections.

Maintenance requests sometimes can be worked along with new construction jobs. Those which cannot are rescheduled.

An example of the new plan is found in the maintenance of network protectors. Past practice was to overhaul all of them annually. The possibility of extending this schedule to three or four years was considered.

Study of the number and cause of protector failures on drop-out tests showed relay trouble and open circuit in the protector trip circuit were the principal difficulties. Failures from these causes would not rise with an increase in time between overhauls, provided relay tests were continued.

Analysis of the problem and study of the experience of other companies led to extension of the overhaul schedule to three years. Experience with the three-year schedule prompts consideration of a four-year one.

Drop-out tests on the underground network feeders every two weeks check the operation of network protectors. Each feeder is opened and reclosed, one at a time, until all have been checked or one "hangs in." Feeder oil circuit breakers are opened with the overload relays and are left open approximately 1 min. before reclosing to allow the network protectors to open. Opening of the protectors is indicated to the operator by zero reading of the feeder voltmeter on the circuit breaker panel.

If the voltage fails to drop to zero, indicating that a protector has not opened, the feeder is left out; and

Improves Distribution Maintenance

the maintenance crew is dispatched to find the protector that failed to open. This then is locked open, the feeder energized, and the drop-out test resumed.

This test locates defects in the trip function and reduces the probability of a network protector hanging in on a feeder fault.

All network protectors are overhauled completely every three years. Each one is taken apart, its panel and parts cleaned with a solvent, and inspected. Worn or defective parts are replaced, the unit is reassembled, lubricated, and adjusted.

Network protector relays are cleaned also and tested, and then the complete network protector with relays is given mechanical and electrical tests.

Tough Jobs Aren't Put Off

Transformer vaults in the network area are inspected and cleaned on a weekly schedule during the summer peak-load period and every 30 days during the rest of the year to remove paper and trash from ventilators. The operation of ventilating fans is checked and inspections are made to detect need for other maintenance.

Cable insulation resistance tests are made on 4 and 13-kv feeder cables at two-year intervals. The tests are made during the minimum-load period to locate and repair incipient cable faults that could result in overloading and possible damage to other feeder cables.

Test voltages of 15 and 30 kv dc are applied to 4 and 13-kv feeder cables, respectively. Voltages are applied between the conductor and sheath for 5 min. A mobile cable test set is a source of the high voltage.

Similar procedures apply to general overhead line maintenance. Formerly line crews were handed a district map in autumn and told to do maintenance work. This covered everything to put lines in first class condition, such as replacing deteriorated crossarms and poles, tightening guys, straightening poles, and replacing broken insulators. But it didn't work that way. The easy jobs were done; the tough ones held over.

Now a pole-by-pole survey determines the maintenance work required, and individual requests are made for each job. This facilitates routing of crews and fits the job into other work a crew might have in the area.

Centralized Control Next Step

In final form, this program probably will call for centralized control under a maintenance supervisor within the group responsibile for the work. Besides records of equipment performance, outage data, and experienced inspection personnel, the maintenance supervisor will need analysts to organize and interpret performance and inspection data. He will have authority to make decisions and get the work done.

This maintenance group would act as a clearing house for all maintenance work in its area. Reports and orders from various sources would be recorded and investigated. Duplicate reports would be noted and coordinated, and the work would be scheduled according to the best engineering appraisal of necessity and urgency. Notice of completion of the work would be reported back to the source of the order.

NETWORK PROTECTORS are completely overhauled no oftener than once every three years. Cleaning is thorough

Many measures are being taken on the DP&L system to avoid breakdowns. On 13-kv lines routine inspections check for broken insulators and evidence of insulator flashover, application of wood crossarm braces and guy attachments to take advantage of the insulating value of the wood structure, bad tree conditions, the need for maintenance on air break switches, use of lightning arresters at normally open air break switches, application of bird guards on transformer bushings, deteriorated crossarms and poles, truck damage to poles and guys, slack spans, leaning poles, and broken wires.

Routine inspections of 69 and 138-kv lines check for broken insulators and evidence of flashover; damaged conductors, towers, poles, and crossarms; encroachment on rights-of-way; grass and weed growth; and tree clearance.

After an outage on any line a special inspection seeks out the cause.

Banked secondary buses are checked only after an outage to determine the need for maintenance. Conditions on buses supplying residential load are reviewed annually on the IBM transformer load survey.

Primary capacitor banks are inspected monthly,

June through October. Blown fuses, bad capacitors, time clocks, voltage control units, and oil switches are checked.

Secondary capacitor banks in residential areas are inspected in spring for blown fuses and bad capacitors. Every summer capacitors in industrial substations are checked.

Industrial Substations Get Summer Check

Automatic dual-service switch installations are checked weekly for blown fuses, switch position, and operation counter reading. Transformers and potheads at these locations are reviewed at the same time.

Industrial substations are checked every summer for oil temperature; broken or dirty insulators or bushings; oil leaks; condition of yard; fence and structure; fuses; capacitor installations; and evidence of heating of transformer secondary terminals, bus, or service connections.

Formerly poles were inspected to determine their condition and estimate their remaining life. The system was covered every five years.

New construction in the past ten years has doubled the number of poles while 4 to 13-kv conversions and jobs increasing the conductor size on old 13-kv lines have necessitated replacement of many old poles. As about 75% today are less than ten years old, no special inspection is needed. Bad poles are reported by line inspectors, linemen, troublemen, and field engineers.

The tree-trimming program aims at complete coverage each year on the premise that once established this plan requires only elimination of annual growth to maintain reasonable clearance. Trucks are equipped with special bodies, ladders, and power pruning and trimming tools. A chipper reduces trimmings to chips. A truck with a hydraulically operated boom-mounted platform is available.

Transformers Inspected in Shop

When inspection of an industrial substation shows the need, insulators and bushings are replaced or cleaned, oil leaks stopped, and transformers cleaned and painted. Insulators and bushings subject to contamination by spray from cooling towers or by industrial waste may be coated with a silicone compound to reduce leakage and risk of flashover.

All transformers are opened in the shop and inspected for damage, loose fastenings, oil level and condition, and loose connections before going into stock. This applies to new as well as to transformers removed from service. Primaries are energized and voltage readings made on secondaries. Old transformers are painted if required. All accessories are checked and minor repairs made.

When CSP-type transformers, 15 kva and larger, are removed, their breakers are set up approximately 30% (if not done previously). Signal light settings are left normal where the type of breaker permits. Tests are made to check operation of the circuit breaker and overload signal light in sizes 15 kva and larger, and they are recalibrated if required. This test requires about 15 min per transformer. It consists of sending a calibrating current through each thermal trip element and part of the secondary winding, with the primary winding shorted and measuring the time for the signal to light and the breaker to open.

No attempt is made to reclaim deteriorated transformer oil except to remove moisture and restore the dielectric strength to more than 30 kv. Oil high in acidity and badly sludged is replaced with used filtered oil if the transformer is old. New inhibited oil is used when it is necessary to add oil to new transformers.

Damaged Conductors Replaced

Valve type arresters are inspected for cracks or other visible damage. Leads are spliced if necessary. If otherwise satisfactory the unit is flashed over on a small ac hipot set of limited capacity to determine the approximate sparkover voltage. Arresters with low sparkover voltage are junked; those in the acceptable range are placed in stock.

Expulsion arresters are replaced if the gap is sufficiently burned to indicate excessive follow current. Arresters with external damage are repaired. The gaps are set to ½ length.

Damaged or bare three-wire No. 8 or No. 6 copper services are replaced with aluminum Triplex No. 4 or No. 2 cable as required, using compression type of the same metal connectors. Bolted type connectors formerly used on aluminum services are being replaced with compression type light metal connectors.

SILICONE COATINGS protect insulators from atmospheric contamination caused by spray from nearby cooling towers

DETROIT EDISON CUSTOMER — GENERAL MOTORS TECHNICAL CENTER

DISTRIBUTION TRENDS REPORT:

Automated Industry and phenomenal load growth challenge Detroit Edison's distribution planning

Over the last decade, Detroit Edison's industrial load has soared at an amazing rate. In Wayne County, for example, load rose 617%. At the same time, a trend towards locating industry in what had heretofore been farmland, like the site of General Motors' Technical Center, posed an unusual problem for Detroit Edison. For in addition to steel mills and other plants, among their largest customers are automated and semi-automated automotive plants. Their power requirements necessitate an uninterrupted supply of electricity at constant voltage and constant frequency.

Hence Detroit Edison became one of the first utilities in the nation to be confronted with a voltage dip problem of large magnitude. Providing their customers with "quality" electricity, and enough of it on time as load skyrocketed, was the challenge before Detroit Edison.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's how Detroit Edison met this challenge ➧

DISTRIBUTION TRENDS REPORT:

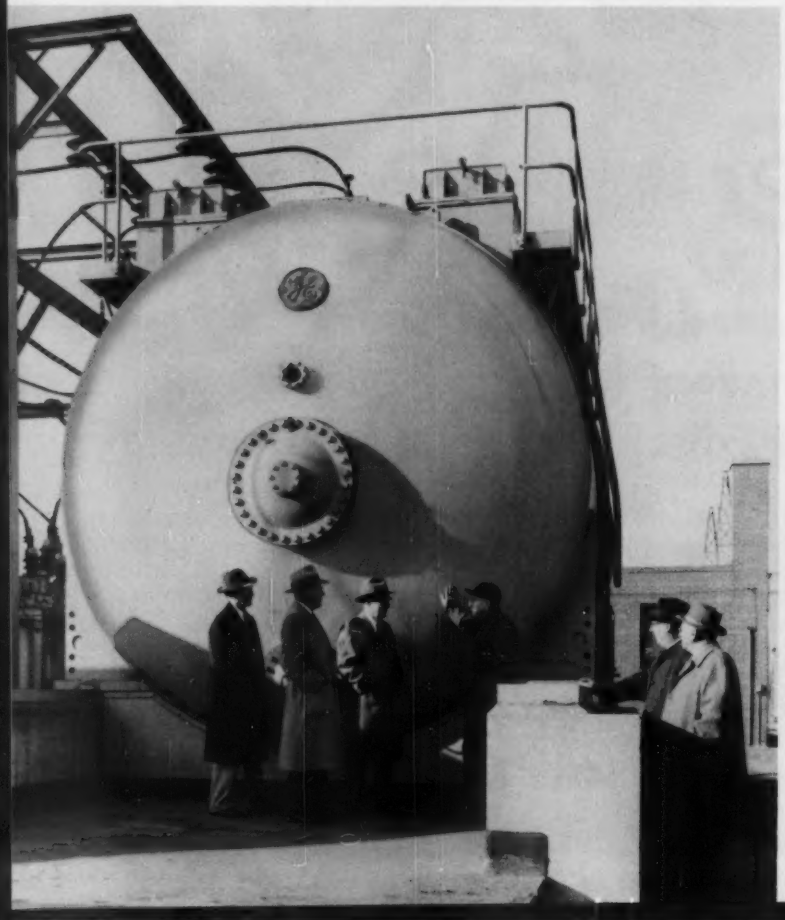
User-utility tests, alert field force, and advance purchase of substation sites, help Detroit Edison provide "quality" power; stay on top of rising load

A combination of forthright moves has placed Detroit Edison ahead of its voltage dip and tremendous load growth problems. Expansion and additions to automotive, chemical, steel mills and other plants, plus the increasing use of automation, posed these problems for Detroit Edison.

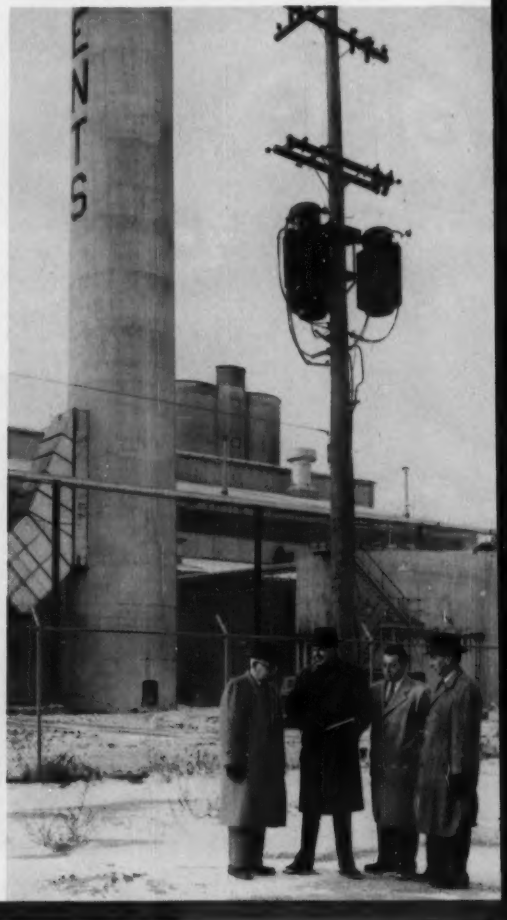
HERE IS WHAT THEY DID ABOUT IT:

Voltage Dip — Detroit Edison was one of the first utilities to recognize voltage dip as a major problem because of increased automation in industry. Since there was no precedent set for its solution, they ran a series of comprehensive tests in user plants and determined that much responsibility for voltage control lies with machine designers and users. Control improvements were suggested, and in certain plants, General Electric voltage stabilizing transformers were recommended and used with great success. Another important measure was the installation of two 50,000-kva General Electric synchronous condensors to prevent flicker when a steel mill customer

IMPROVED POWER FACTOR and elimination of flicker is obtained with this 50,000-kva General Electric synchronous condensor. Detroit Edison's S. W. Luther, Ass't. Chief Planning Engineer; J. W. Miller, Ass't. Sup't., Substations; D. D. Chase, General Sup't., Electrical Systems; E. E. Radcliffe, station operator; G-E Sales Engineer, M. B. Lucas; and D. Shea, D.E.'s Area Foreman, discuss the condensor's performance.



EFFICIENT TRANSFORMER MOUNTING is evidenced by cluster of three 100-kva General Electric distribution transformers on one pole. Discussing it are: Detroit Edison's Wylie Groves, Chief Planning Engineer; General Electric Sales Engineer, J. Berka; Vaughn Andres, Planning Engineer, and John McCowan, General Sup't., Overhead Lines Dep't., both of Detroit Edison.



INTEGRATED PLANNING provides clue to Detroit Edison's highly successful operations. Here, E. R. Moore, Manager of Engineering; D. D. Chase, General Sup't., Electrical Systems; J. Berka, G.E.; Ass't. Chief Planning Engineer, S. W. Luther and Ass't. General Sup't., Electrical Systems, F. C. Pohl and W. F. Wetmore, Director of Planning and Project Engineering discuss mushrooming load.

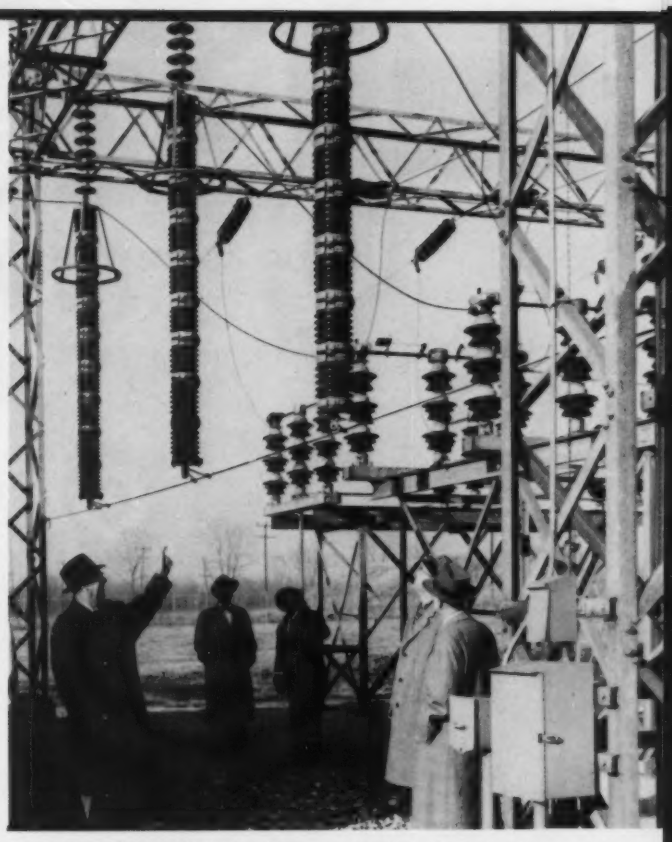
operated large electric furnaces. General Electric gave valuable application engineering aid in this move which safeguarded the quality of voltage going to residential and commercial customers in the area. Of course, Detroit Edison also gave particular attention to applying General Electric Magne-valve lightning arresters which helped alleviate lightning flashover, a major cause of voltage dip, whenever lightning or switching surges occurred.

Load Growth — Detroit Edison has utilized imaginative methods to cope with growing load. An alert field force observes local growth patterns and integrates their findings with the system planning and engineering sections. In many cases, D.E.'s field personnel work with users and suggest, with planning section recommendations, the best sites for new plants in terms of load.

In accordance with this operation, Detroit Edison is purchasing substation sites, occasionally as far as seven years ahead of their estimated need. As load increases to a level that requires building these stations, General Electric regulators and capacitors provide excellent service.

When You Specify General Electric, you take advantage of the latest advances in apparatus design, construction, application and the assistance of complete engineering services. To help utilities keep service running smoothly, highly trained General Electric service engineers plus a network of Service Shops stand ready to meet any and all maintenance and repair needs — day and night.

For Full Information on distribution equipment and Distribution System Services, contact your nearby General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, New York.



MAXIMUM PROTECTION for the Jefferson substation's 120 kv line is afforded by these Thyrite* Magne-valve station-type arresters which allow up to 20% greater protection. L. to r., G-E Sales Engineer, M. B. Lucas; and D.E.'s E. Zavitz, Stations Engineer; W. O. Bramwell, Gen. Foreman, Operating Div., Substation Dep't.; C. E. Quick, Industrial Power Planning Engr.; A. P. Fugill, Chief Electrical Engr.
Registered trade mark of General Electric Co.

EXCELLENT STREET LIGHTING is provided by General Electric fluorescent luminaires. Lighting such as this is representative of a good part of Detroit Edison's commercial load.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's why it pays to see General Electric about your distribution problems

DISTRIBUTION TRENDS REPORT:

Product development at General Electric helps solve the voltage dip problem

The transformer development facilities at General Electric were able to assist Detroit Edison's customers in solving the problem of voltage dip lasting two or more cycles. This duration was sufficient to cause contacts to drop out on customers' control circuits in automated operations, shutting down their machinery and resulting in production and manpower losses.

General Electric voltage stabilizing transformers will maintain voltage at a level that will keep relays locked-in even though the line voltage may drop to 30% of normal for two to twenty cycles. A series of tests proved the value of these units, and they are now in successful operation in several plants served by Detroit Edison. This illustrates one of the major objectives of General Electric's research and development programs: to provide the electric utilities and their customers with apparatus to match the operating requirements of tomorrow.

When you specify General Electric, you get the benefit of General Electric Distribution System Services which include headquarters system planners — district application engineers and product specialists — extensive product development facilities — equipment installation and field service engineering.

These services offer assurance of maximum operating continuity, on-the-spot application help, equipment efficiencies, valuable help in system design and techniques.
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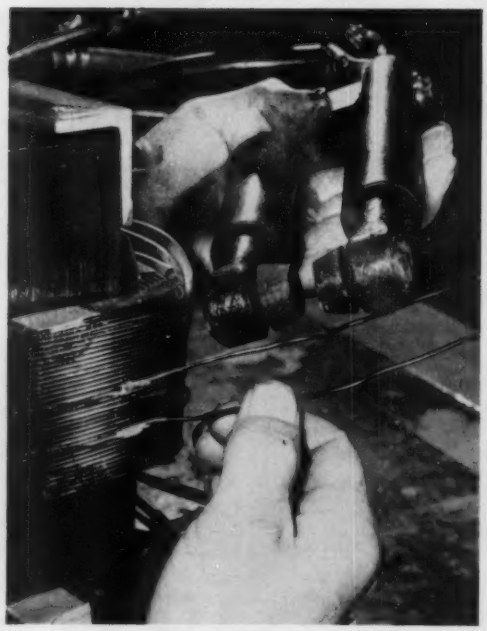
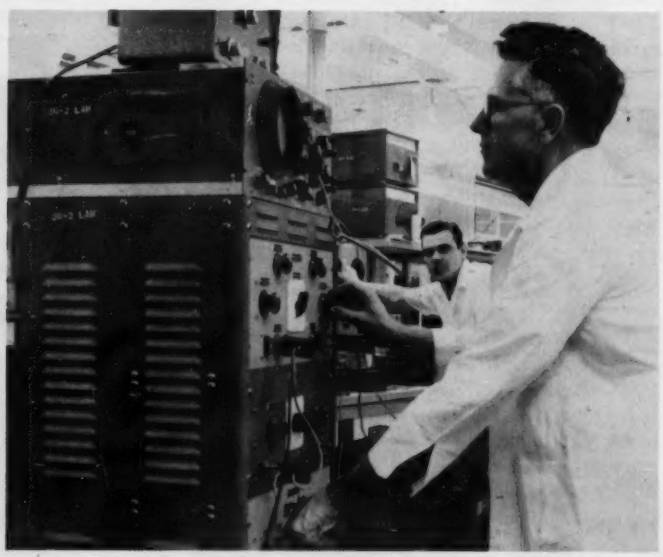
3034

LIVE BETTER ELECTRICALLY





DEVELOPMENT FACILITIES at General Electric Specialty Transformer Lab in Fort Wayne are continually being enlarged to help utility customers solve transformer design problems, with particular attention to applications needing close voltage control.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Utility Service Center Has Modern Garage

Modern automotive servicing facilities are in use at Dayton Power & Light Co's new service center. The building for servicing a fleet of 400 vehicles is 183 by 110 ft and does not store cars.

Five modern hydraulic hoists put vehicles in the most convenient position for work to be done, and provisions have been made for two additional hoists. Two motors operate the hoists, one for a group of three and the other for a group of two hoists. Plans call for the seven hoists to be used as follows:

1—for body repairs (Future).
1—For changing and servicing tires.
1—For greasing cars.
1—For washing cars.
2—For car repairs. (A third for future).

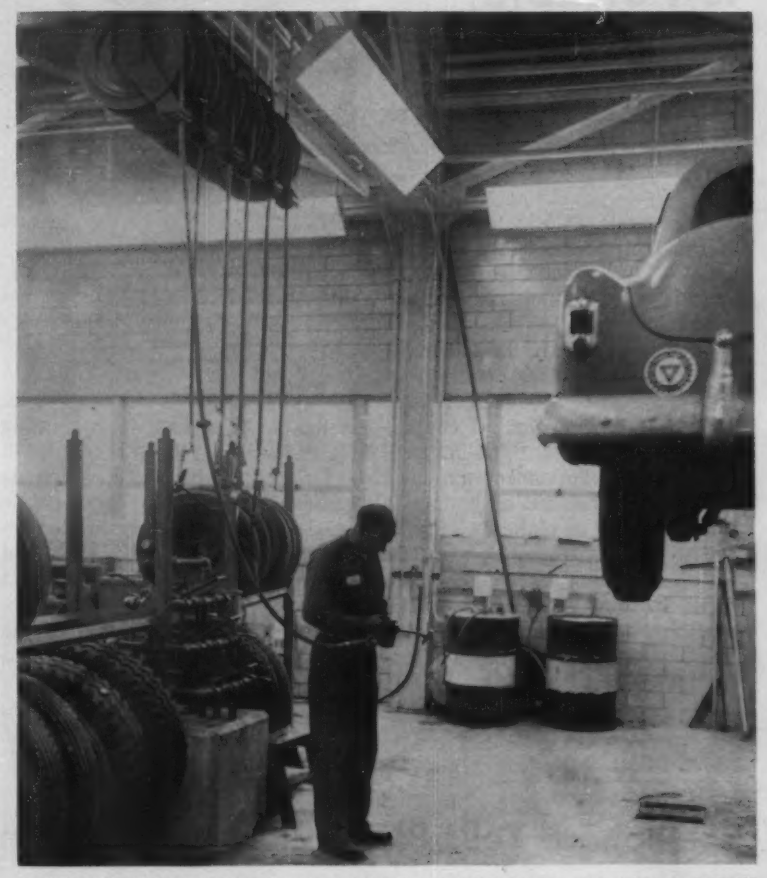
The hoists raise the entire vehicle, or the front or rear end as desired for convenience for the job at hand. The hoist for car washing is enclosed so that there is no splash of water to other areas. Drains surround the area. There is no standing water and water does not run to other parts of the floor.

The grease rack has rubber hoses hanging directly overhead. Each hose is connected to a supply of a different kind of oil or grease, and the group provides all types for servicing the fleet.

The two spray painting rooms are tightly enclosed. Its air is filtered to eliminate dirt in the spray painting operation. The exhaust is through a water spray which prevents paint spray from being exhausted to the atmosphere.

High intensity lighting is provided throughout the garage area. In the spray painting rooms four-tube fluorescent fixtures are recessed in the ceiling and covered with reinforced diffusing glass. In the repair and servicing area, each work section is surrounded on three sides by four-tube, open-type fluorescent fixtures. They are mounted high and tilted to direct light to the particular work.

(More How To on page 108)



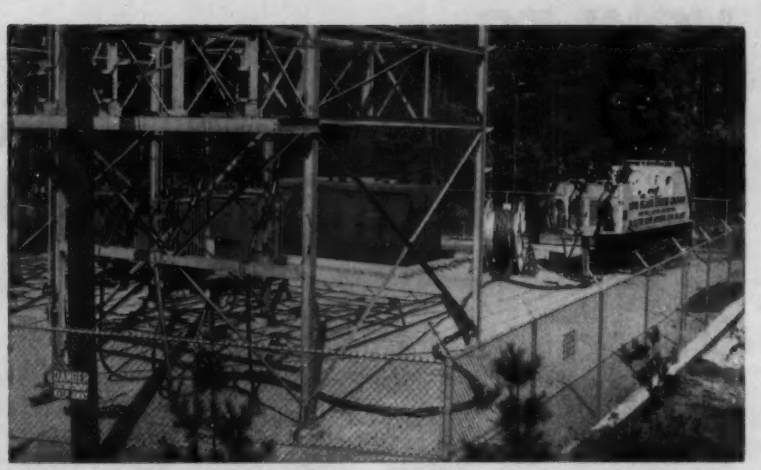
SEVEN HYDRAULIC HOISTS WASH, GREASE, CHANGE TIRES, AND REPAIR BODIES

MODERN GARAGE FACILITIES ARE ADEQUATE, FLEET GROWTH IS PROVIDED FOR

SUBSTATIONS—Maintenance

34.5-Kv Cable Is Portable, Expedites Job

A. C. SEALE, Substation Maintenance Supervisor, Long Island Lighting Co, Hicksville, N. Y.



PORTABLE CABLE on special reel connects mobile substation to the 23-kv line. Reel permits unwinding of both ends of three-conductor cable as needed

A portable 34.5-kv cable on a special reel reduces costs and outages for Long Island Lighting Co by expediting installation of a mobile substation, repair of cable failures, and rebuilding of overhead lines.

The portable cable consists of 200 ft of three-conductor twisted 2/0 cable having No. 30 copper-wire shielding and 9/64-in. neoprene jacket. Permanent terminals were factory installed on both ends for connecting to potheads.

This cable is wound on a special reel that permits unreeling of both ends, so that terminals are immediately accessible. The reel is of steel construction and has a 90-in. head dia, 60-in. drum dia, 40-in. inside traverse, and 45-in. outside traverse.

Originally, the cable was purchased for connecting up a mobile substation. In this application, it eliminated installation of poles and stringing of open wire. Associated clearance problems are reduced because the cable can be laid on the ground or positioned easily without creating a hazard to workmen.

Since the cable has been available, it has been used also for making emergency repairs on 13, 23, and 33-kv cables in stations and for a by-pass when rebuilding complicated poles where lines cannot be taken out of service. These applications cut outages and expedite new construction and maintenance work.

DISTRIBUTION—Operations

Semaphore Tells Blade Position to Ground Observers

H. A. SCHANBACHER, Staff Engineer, Overhead Distribution, Department of Water & Power, Los Angeles, Calif.

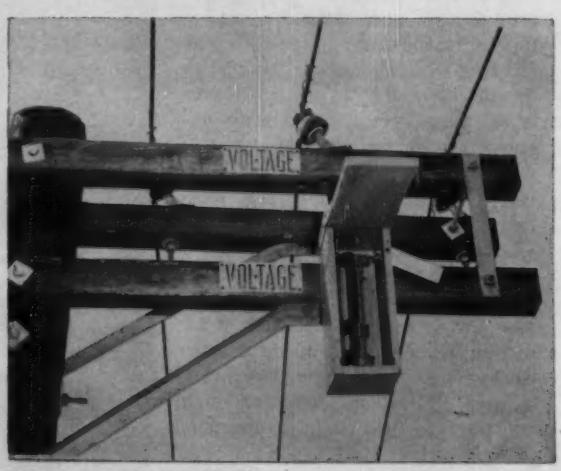
A semaphore on a weather-resistant housing allows linemen to see from the ground the position of disconnect switch blades.

The housing keeps the blades together and out of the weather.

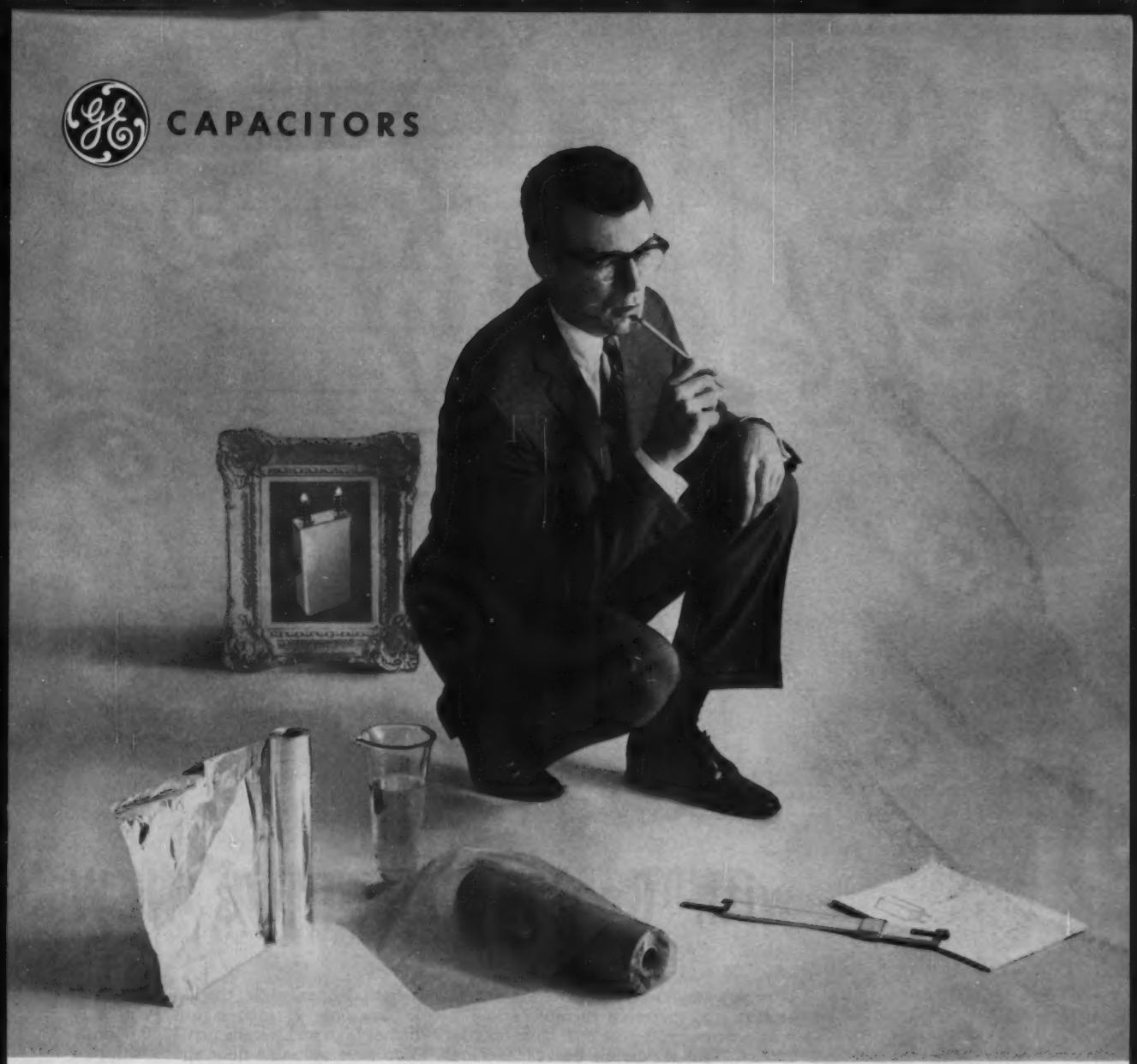
The Los Angeles Department of Water & Power uses 200-amp, 7.5-kv disconnect switches on 5-kv primary laterals at tie points. Switch housings are gray with a white "D" in the center of the door to distinguish them from fuse cutouts. The semaphore housing is attached to the opposite end of the crossarm which mounts the disconnect switches. The housing is similar in size to commercially-available disconnect switch boxes.

At the rear of the housing are two hooks on which blades may be hung when not in use. The third blade hangs from a separate hook which operates the semaphore.

The exterior portion of the brass semaphore is covered with red reflecting tape. The tape provides positive indication of the position of the semaphore and can be seen easily by linemen on the ground. An "up" position indicates that the blades are in the storage box and that the disconnect switch is open.



RAISED SEMAPHORE tells lineman on ground that disconnect switch is open. Red reflecting tape is aid to visibility



TOMORROW:

50-kvar, 50-pound capacitors?

Metal foil, kraft paper, and a liquid dielectric...basically, that's all there is to a power capacitor. But add imagination and the facilities of General Electric research and anything can happen.

Progress in the manufacture and application of paper, foil, and liquid impregnant has already made capacitors smaller, lighter, and more dependable. General Electric designers work constantly with suppliers to make these materials more nearly perfect capacitor components.

General Electric capacitor development never stops. While the ideal of a one-pound-per-kilovar capacitor may seem just a pipe-dream today, the reality may be taken for granted tomorrow. This is just one project that G-E designers are seriously tackling today.

Want more information on General Electric capacitors? Your local G-E Apparatus Sales Engineer will be glad to help you. Or write to General Electric, Section 445-6, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

YOU SAVE

45%

with General Electric's NEW

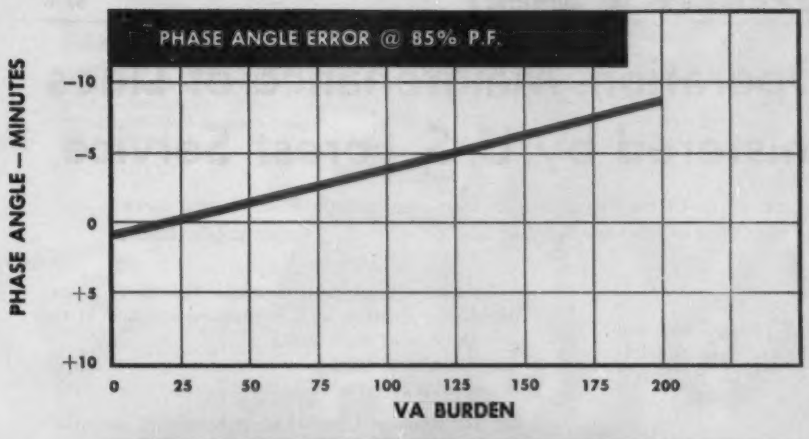
Now you can afford complete 4-wire protection and metering to replace any 3-wire schemes you may now have on your system. This is possible because General Electric's new Cascade potential transformers are priced 45% lower than conventional high-voltage transformers of the same ratings—3 115-kv Cascade units cost almost $4000 less than 2 conventional delta connected types.

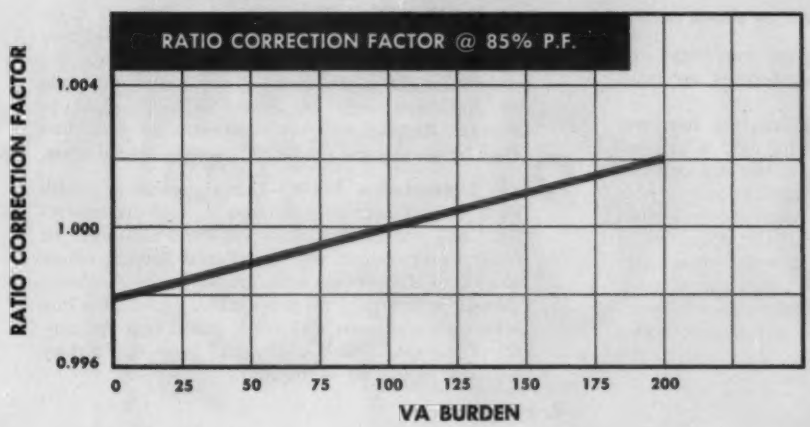
HIGH ACCURACY—Surpassing all ASA accuracy requirements, these new low-cost transformers also overcome the disadvantages of inflexible potential devices such as small useful burden, poor accuracy, and operational variations in characteristics.

LESS SPACE—Besides being 45% lower in cost, the new General Electric Cascade transformers are smaller and lighter in weight. For example, the 115-kv unit has a base only 21 inches square; it is 88 inches high and weighs just 1500 pounds. You save valuable floor space, shipping costs, and more than $2000 in original cost compared to the conventional high-voltage potential transformer.

WHY THESE SAVINGS?—These savings result from General Electric's new cascade design. In conventional potential transformers, as voltage rating is increased, insulation and most other materials have to be increased by about the square of the voltage. In cascade design, voltage is divided and insulation requirements are reduced.

MULTIPLE STAGE DESIGN—General Electric's new Cascade instrument transformer consists of several units connected in series or cascade. For example, in the





Cascade Instrument Transformer

115-kv unit, three stages are employed, each designed for $\frac{1}{3}$ the total system voltage. Since only $\frac{1}{3}$ the voltage is applied to each section, insulation material requirements are reduced considerably making it possible to get a high-quality instrument transformer selling for approximately $2450.

MORE INFORMATION—For more detailed information on General Electric's new Cascade instrument transformers for applications 115 through 230 kv, call your General Electric Apparatus Sales Office. Or write Section 581-4, General Electric Company, Schenectady 5, N. Y.

ESTIMATED NET PRICE COMPARISON

INSULATION CLASS	BIL KV	CONVENTIONAL TYPE ES	CASCADE TYPE EU
115 KV	550	$4,480	$2,450
138 KV	650	5,880	3,220
161 KV	750	7,364	4,060
196 KV	900	14,000	7,700
230 KV	1050	21,000	11,550

GENERAL ELECTRIC

Construction, Operation, Maintenance of Lines on Land Administered by U. S. Forest Service

This presentation is an adaptation of Rural Electrification Administration Bulletin 80-8. It may serve as a guide to construction and operation of lines on rights-of-way on private or other public lands.

I. Purpose of Instructions

To inform borrowers of requirements in constructing and operating electric lines on National Forest and Land Utilization Projects lands administered by the U. S. Forest Service.

II. Rights-of-way on Lands Administered by Forest Service

Following steps should be taken by the borrowers and their engineers to obtain right-of-way permits on lands administered by the Forest Service.

A. Prior to planning location of a line, the borrower should consult the District Ranger in the case of national forest lands, or the Project Manager in the case of Land Utilization Project lands, as to r/w application.

B. Whenever the proposed line on national forest lands is a primary transmission line within the definition of the Federal Power Act (transmitting power from a water power source to the point of junction with the distribution system or with the interconnected primary system), the Federal Power Commission has jurisdiction; and a license authorizing construction must be obtained from that agency. The District Ranger can assist.

III. Construction of Lines

Following conditions and procedures shall be observed in construction and operation of distribution and transmission lines through lands administered by Forest Service.

A. Standards

A. In construction of lines, standards in the latest revision of the National Electrical Safety Code shall apply except where local regulations are more stringent. Grade C construction shall be used for distribution lines except where Grade B is required. Grade B construction shall be used for transmission lines. A line through land administered by the Forest Service operating at or above 33 kv shall be considered as transmission.

1. Sectionalizing of Lines

1a. Distribution Lines—A sectionalizing device or devices shall be installed in the line at or near the point of entrance to timber or brush lands to automatically de-energize the line in event of a persistent fault. Where a line crosses two or more sections of the same timber or brush area, sectionalizing devices shall be installed only at or near the point of entrance to the first section unless other sectionalizing points are required for adequate protection of the line.

Rating and application of the device shall be in accordance with REA Bulletin 61-2 or the latest revision.

1b. Transmission Lines—An oil circuit breaker shall protect the line entering any timber or brush area but not necessarily be located at or near the point of entrance to the area. However, a sectionalizing airbreak switch shall be installed in the line at or near such point.

2. Right-of-Way

2a. Distribution Line—The right-of-way on which the line is built shall be cleared at least 10 ft on each side of the pole line. Local conditions may require additional width to provide adequate fire protection. Determination of width shall be made by discussion with the Forest Service officer in charge. Right-of-way on each side of pole line shall be maintained at width previously agreed upon.

2b. Transmission Lines—The right-of-way width shall be sufficient to provide adequate fire protection, and the determination of the width shall be made by discussion with the Forest Service officer in charge. To provide safe clearance, the r/w edge should be at least 2 in. per 1,000 v beyond the line conductor's extreme side swing position at the center of the span. This width shall be maintained by periodic reclearing or trimming.

B. Permits

1. Forest Service agreements and permits, requiring borrowers to correct or eliminate inductive disturbances on the Forest Service communication lines due to the proximity of REA lines, must be forwarded to REA for review and adminsitrative approval to final acceptance by the borrower.

2. Borrowers and their engineers should make all reasonable efforts to locate lines where inductive effects on communication lines is expected to be at a minimum.

3. Joint use of poles may offer advantages in some situations, and where adopted, REA Form 283, Agreement for Joint Use of Specified Poles, is recommended.

IV. Operation of Lines

A. The line through lands administered by the Forest Service shall be patrolled by a competent lineman or inspector prior to the beginning of the fire season as designated by the Forest Service. Transmission lines shall have additional patrols and inspections as required to maintain satisfactory safety and service. Any hazardous conditions reported by these inspections shall be remedied immediately. The District Ranger or Project Manager shall be notified by letter of the completion of each patrol and of the correction of any hazardous conditions found.

B. It is expected that the District Ranger or Project Manager will submit a report to the borrower of any hazardous conditions which come to his atention, whereupon the borrower should reinspect the lines and make any necessary corrections.

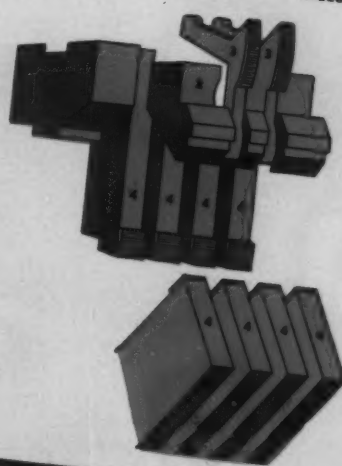
G-E Type AK-1-50 Electrically Operated Air Circuit Breaker, 1600-amperes, 600 Volts, A-C. One pole shown. Made by General Electric Company, Low Voltage Switchgear Department, 6901 Elmwood Ave., Philadelphia, Pa.

Here is the General Electric Type AK-1-50 Electrically Operated Air Circuit Breaker, 1600-ampere frame size used to protect low-voltage systems. The picture shows one pole of the contact, and in order to photograph it, the housing and the arc-quencher parts were removed. Note the Revere Extruded Shapes, and Rectangular Rod. There are three shapes, and one size of bar, all in copper, because copper has the highest electrical conductivity of all commercial metals.

If these shapes had to be "hogged" out of bar, they would be expensive, due to the machining time, and the scrap generated. While copper scrap is readily salable at good prices, it is costly from the machining standpoint. Extruded shapes by Revere, preformed to the desired contours, usually reduce machining to a cutting-off operation, plus such minor details as drilling which cannot be done during extrusion. Shapes naturally cost more per pound than bar or rod, but the ultimate saving makes up for the difference and more, sometimes several times.

Are you doing much machining of copper? If so, look into Revere Extruded Shapes. They may save money, and speed up production as well. See the nearest Revere Sales Office.

Sketch showing details of contacts. Nos. 1, 2 and 3 are extruded and drawn copper shapes. No. 4 is rectangular copper bar. Cross hatching represents special arcing contacts brazed to the copper.



REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y. —Sales Offices in Principal Cities, Distributors Everywhere

AW Conference Pushes Industry Coordination

Speakers tell largest conference to date that industry segments must work together for success. Three contest awards highlight proceedings

More than 400 electrical industry members turned out for the 13th annual conference of the National Adequate Wiring Bureau in Chicago on Feb. 21-22. The conference, the largest to date, had as its theme the coordination of all national and local AW programs.

General chairman was L. E. Barrett, president of Barrett Electric Supply Co, St. Louis, and a member of NAWB's Executive Committee. According to Barrett, four out of five American homes, and an equal proportion of small business concerns, are limited to an "electrical starvation diet because of inadequate wiring."

Keynoter was D. S. Kennedy, president of EEI and president of Oklahoma Gas & Electric Co. He called for a concentrated effort from all segments of the industry to support the HOUSEPOWER program and the efforts of the NAWB to make American adequate-wiring conscious.

Highlights of the conference also included:

• "The Arizona Story", a 6-part summary of the home wiring modernization program in Phoenix, Ariz., presented by E. E. Cannon, Cannon & Watson Electric Co, Phoenix; L. Waggoner of Arizona Public Service Co, and Leo Sherman of Salt River Power District.

• A roundup of national advertising and promotional programs being conducted by various segments of the industry was presented by Milton Allen, vice president of Philadelphia Electric Co, and a member of the Bureau's Executive Committee.

• A HOUSEPOWER forum, dramatizing the EEI-NECA sales training program for selling residential wiring modernization jobs, was staged.

• The importance of selling adequate wiring to the home builder, and how it can be done successfully was the subject of a speech by L. N. Weiner of Franklin Builders' Homes, Inc., Wilmington, Del.

• "Where Do We Go From Here", a presentation by H. Watson of GE at Bridgeport, Conn., discussed the probable trends in future development of AW standards. He expects:

1. A requirement for room air conditioners in houses where central air conditioning is not planned.

2. A recognition that so-called appliance service centers will partially satisfy the requirements for receptacle circuits in kitchen and laundry areas.

3. An outlet for central air conditioning where the heating system is planned to accept a cooling unit.

4. Enlargement of the table of branch circuits to include circuits for air conditioning, refrigerators, freezers and built-in ranges.

5. A more complete coverage of service entrance equipment and conductors with requirements for spare capacity.

6. Services and feeders for resistance heaters and heat pumps (a suggestion only).

Awards—Look magazine again made awards to industry members for their efforts on behalf of adequate wiring. These went to contractors, distributors, dealers and utilities. The power companies also received awards from Living for Young Homemakers for home building. NEMA's Competitive Fuels Committee made awards for rural loadbuilding.

• The president of the National Association of Electrical Distributors, Ralph Brown, of General Electric Supply Corp, Bridgeport, Conn., described NAED's plans for 1957. Brown outlined the plans in which member companies will be asked to submit progress reports on their programs and results achieved. These will be printed in NAED's newsletters to enable other members to capitalize on their ideas.

• NAWB's new commercial and institutional program was the subject of a panel discussion entitled, "Let's Talk Business." Andrew Doremus, chairman of NAWB's Plans Committee, and also of GE at Bridgeport, moderated.

• The conference ended with a series of short presentations of wiring sales and promotion activities of proven value.

(More Selling on page 118)

ADEQUATE WIRING VIP'S at NAWB's conference are (l to r) NAWB Chairman, C. T. Bremicker, EEI President D. S. Kennedy, and Chairman L. E. Barrett

RT&E Transformers

Weather Protected to Serve Longer

Like the postman, neither rain nor snow, nor hail, nor salt spray can prevent R T & E Transformers from doing their duty. Here's proof that every R T & E unit is completely "WEATHER PROTECTED."

- **FINISH:** Three coats of modified Alkyd paint for all season protection.
- **DESIGN:** Domed cover for immediate water run-off.
- **TANK:** Arc-welded seams and absence of lip on tank bottom mean no moisture collecting cracks and crevices.
- **BUSHINGS:** HV bushings internally clamped — no external clamps and bolts to corrode.

Plus stainless steel cover band to eliminate corrosion on accidentally scratched areas . . . stainless steel threaded mounting pads . . . all unpainted fittings either galvanized or electro-tinned.

R T & E "Weather-Protected" Transformers last longer, require less maintenance, serve better all year 'round.

Equipment to help provide power for America.

RT&E
CORPORATION
WAUKESHA, WISCONSIN

BEST BURNER BIG BOILERS

...C-E Tilting, Tangential Burner

Nearly 450 C-E Boilers with an aggregate capacity of well over 200-million pounds of steam per hour are now in service proving the advantages of firing with C-E Tangential Burners. And another 125 units are under construction or on order. The more important of these advantages are:

BETTER COMBUSTION

Tangential firing is fundamentally the best method of firing any fuel – coal, oil or gas – particularly in big furnaces. Here's why:

1. **The extreme turbulence created by impinging flame streams of adjacent burners assures the most effective mixing of all the air with all of the fuel to produce the most rapid and complete combustion.**

2. **The swirling, rotating travel of combustion gases fills the furnace cross-section and utilizes the heat absorbing wall surfaces most effectively.**

SUPERHEAT CONTROL

Virtually all tangential burners in large C-E utility boilers are of the vertically adjustable (tilting) design. This feature provides, in addition to the exceptional combustion efficiency inherent in tangential firing, a degree of superheat temperature control which cannot be achieved with any other firing method. Here's how:

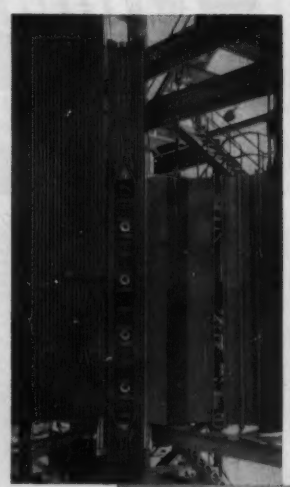
1. **If steam temperature goes too high, the C-E Tilting, Tangential Burner nozzles *automatically* tilt downward. More furnace wall surface becomes effective. Gas temperature to superheater surface is lowered. *Steam temperature comes down.***

2. **Conversely, if steam temperature drops below that efficient for the turbine, nozzles tilt upward, sending hotter gases to the superheater. *Steam temperature goes up* — automatically.**

As a result, the minimum gas temperature necessary to assure proper superheat is maintained. There is little need for desuperheating . . . minimum use of spray water . . . less chance of fouling turbine blades. Turbine availability is higher . . . efficiency is maintained.

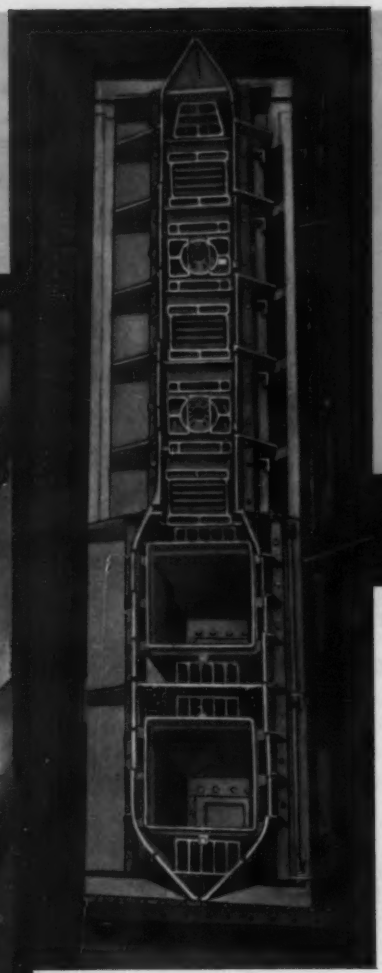
In the most important areas of performance, therefore, the tangentially fired unit has established itself *in service* over a period of many years as the best method of firing for big boilers. More recently it met similar success in smaller oil and gas fired units for capacities as low as 50,000 lbs of steam per hour.

A new catalog, PC 8, gives many more details. May we send you a copy?



C-E Tangential Burners are now shop assembled with adjacent furnace tubes in place. The illustrations below and at left clearly indicate the resulting advantages in transportation, handling and installation.

FOR



▲ The versatility of the tangential burner is well illustrated by this rather special design, made for a wide variety of fuels. This burner has nozzles for coal, oil, coke oven gas and — at the bottom — blast furnace gas. The latter is stationary—the rest are adjustable.

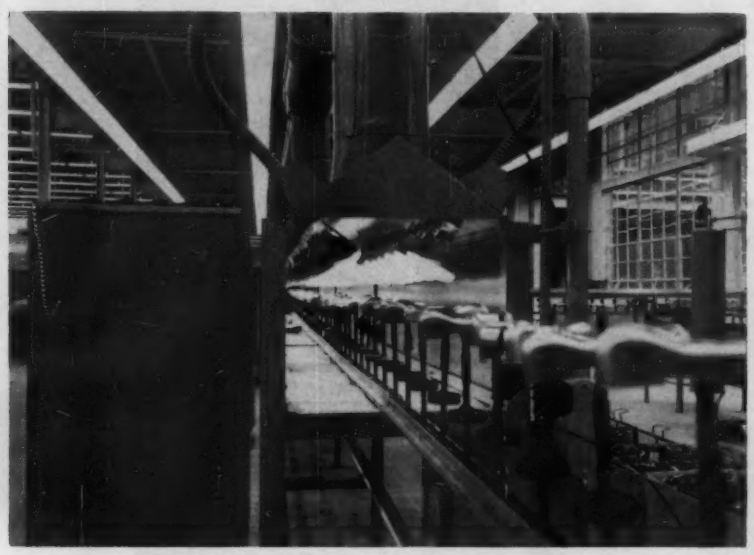
◀ . This view of the firing floor of a large tangentially fired C-E utility boiler shows the clean-cut, uncluttered appearance which is typical of units of this type.

COMBUSTION ENGINEERING

B-961

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

STEAM GENERATING UNITS • NUCLEAR REACTORS • PAPER MILL EQUIPMENT • PULVERIZERS • FLASH DRYING SYSTEMS • PRESSURE VESSELS
HOME HEATING AND COOLING UNITS • DOMESTIC WATER HEATERS • SOIL PIPE



Automated finishing line with infrared baking oven . . .

Cuts Operation Costs 500%

A conveyorized, infrared baking oven which dries enamel on small steel stampings and zinc die castings has cut the labor cost of this operation by over 500% at the Greist Manufacturing Company, New Haven metal parts manufacturer. The design of the oven is such that it does not require expensive insulation or sealing at the ends. Baking time can be easily adjusted to meet the needs of the product.

The oven requires no preheating; parts start heating up as soon as the lamps are turned on. By combining degreasing, spraying, and baking with one loading on the conveyor, cost of the operation has been slashed drastically. With parts moving through the oven on the conveyor, each piece is heated quickly and uniformly to the proper baking temperature. The oven is L-shaped, with one leg 10 ft long and the other 20 ft long.

Heat from the 120 infrared lamps, each rated 375 watts, is directed on the work. Consequently, the oven remains relatively cool and, even without heavy insulation, does not heat up the surrounding work area unduly. The lamps are spaced on 6-inch centers, arranged in two rows of 60 lamps each.

To obtain different heat levels, oven is wired in twelve circuits, each individually controlled. Each row has six banks of twelve lamps. When sensitive colors are dried, one or more rows may be turned off to avoid overbaking.

Conveyor speed is variable from five to 15 ft per minute for different applications. Spindles may be spaced on either 3-inch or 6-inch centers, depending on the size of the product. Each piece spends between three and five minutes in the oven. Normally, between 1200 and 1500 pieces are handled per hour.

Oven operates at 220 v, is rated 45 kilowatts on full draw. The lamps are arranged in pairs, with two 110-v lamps in series in each pair. Estimated consumption per piece runs between 0.0300 and 0.0376 kwhr, according to the oven speed and spacing of parts.

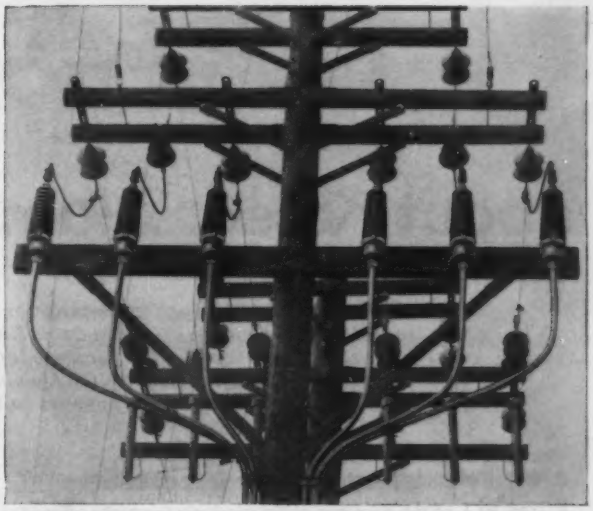
Lamps are spaced approximately 4 inches from the products being baked. Estimated temperature of the parts is approximately 300 F. The products handled include cast or stamped metal parts for sewing machines, cameras, and similar equipment. The finishes are principally synthetic baking enamels in blacks, maroons, grays, blues, and browns. Fumes from the oven are exhausted through overhead ducts.

Pushbutton Thaws Rail Switch

C. PHILIP LYTLE, Northwestern Division Industrial Supervisor, Pennsylvania Electric Co, Erie, Pa.

Electric heating cables, defrosting vital railway switches near Erie, Pa., keep the New York Central's line open despite bitter winter weather. Switch at right, near Harborcreek, Pa., is one of eight, all controlled from a central point in Erie, Pa. Installations total 812 kw. Although other types of heaters have been tried, electric melters need less service and have proven more satisfactory than previous methods.

(More Selling on page 122)



NO GASKETS—NO LEAKS

WITH G&W "SODERTITE" POTHEADS

Type "ST" potheads are factory assembled, with metal-to-porcelain soldered joints. This method eliminates the possibility of future trouble due to improper field assembly of gasketed joints. When these potheads are used, the responsibility for properly sealed main joints rests with our factory. Only the conventional wiped joint and soldering of top vent hole are a part of the field assembly.

In addition to the metal-to-porcelain soldered joints, Type "ST" potheads incorporate design features which improve the electrical and mechanical characteristics.

1 Spun copper wiping sleeve and hood eliminate possibilities of porosity which may occur in cast fittings.

2 Closed hood and simple ferrule design provides extra internal creepage for a given overall length of pothead.

3 External conducting glaze on the porcelain between bottom petticoat and top of wiping sleeve diverts flux from the inside shielding terminus . . . greatly increasing the internal electrical strength of the pothead.

Since their introduction in 1940, Type "ST" Sodertite potheads have achieved an excellent service record. Many electric utility companies have standardized on them.

Bulletin AA56 lists Type "ST" potheads for cables up to 69 Kv. and 2500 Mcm. Send for your copy.

G&W ELECTRIC SPECIALTY COMPANY
3500 W. 127th ST., BLUE ISLAND, ILLINOIS A572

Representatives in many cities of U. S. A., N. & S. America — Canadian Mfr. – Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

High Voltage Cable Terminating, Sectionalizing, Protecting, and Connecting Devices

POTHEADS • BOXES • OIL FUSE CUTOUTS • LOAD BREAK OIL SWITCHES • SPLICING KITS

Answers to

about Kaiser Aluminum's purchase of

As part of its continuing growth program, Kaiser Aluminum & Chemical Corporation recently purchased the Wire and Cable Division of United States Rubber Co., located at Bristol, Rhode Island. The purchase raises a number of questions that are of direct interest to customers of both Kaiser Aluminum and the former Wire and Cable Division of U. S. Rubber. Here are the answers to those questions.

Q. Will all of the U.S. Rubber products still be available?

A. Yes, ALL of the wire and cable products formerly offered by U.S. Rubber will continue to be produced and sold—without changes of any kind.

Q. Who will back up the U.S. Rubber guarantees now? What about replacement?

A. Kaiser Aluminum will guarantee all U.S. Rubber Wire and Cable Division products now in use on the same terms as originally established, including replacement. Former U.S. Rubber products (which will continue to be offered) will carry the same guarantees as before.

Q. I have always liked the way U.S. Rubber people have served my needs; who will be doing the job now?

A. The same people who served you before will serve you now. The purchase includes acquisition of Wire and Cable Division's nationwide sales organization, as well as the plant work force of 1200 people.

Q. Will the price structure remain the same?

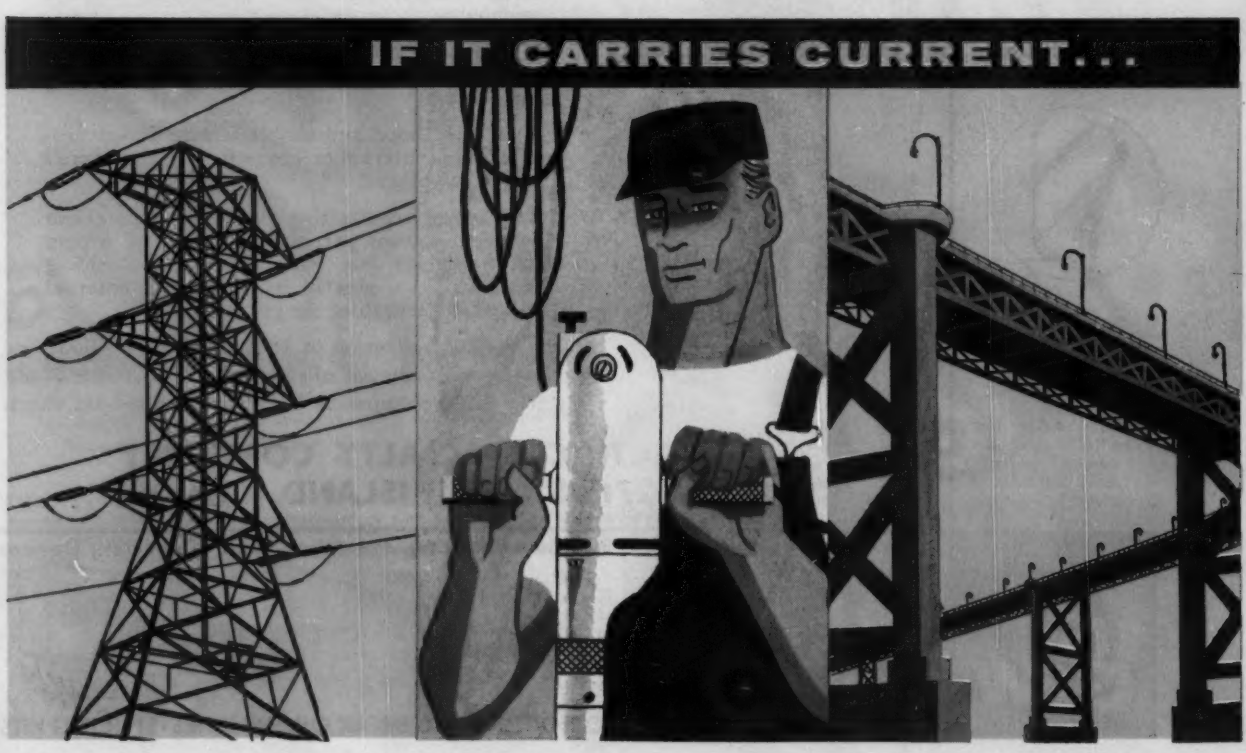
A. There will be no change in price structure as a result of the purchase. Kaiser Aluminum will continue to be a leader in maintaining a stable price structure throughout the market.

Q. Can I now buy both aluminum and copper electrical conductor from Kaiser Aluminum?

A. Yes—and in a wider variety than formerly available from either source. One of the primary effects of the purchase is to broaden the product range offered by Kaiser Aluminum in both aluminum and copper conductors.

Q. How about the insulations used in U.S. Rubber products: will the quality still be the same?

A. These high-quality insulations will remain exactly the same in every specification detail. In fact, they will be *supplied* by U.S. Rubber. Continued research cooperation will exist between the U.S. Rubber scientists and engineers and Kaiser Aluminum.



your questions

U. S. Rubber Wire and Cable Division

Q. Will new people from both companies be calling on me?

A. There will be no duplication of calls, because former U.S. Rubber personnel will be prepared to present the entire, broadened product line to those customers who can benefit by it. Occasionally, Kaiser Aluminum specialists will accompany the former U.S. Rubber representatives to help present the complete line. Conversely, Kaiser Aluminum Sales Representatives will be prepared to present the new, complete line to their established customers, assisted by former U.S. Rubber specialists.

Q. I formerly bought through a Kaiser Aluminum or U.S. Rubber distributor outlet. How will this be changed?

A. The distributor who formerly carried U.S. Rubber wire and cable will continue to offer the same products with no change. Present Kaiser Aluminum Distributor outlets also will remain unchanged.

Q. Will there be any effect on the Field Engineering Services formerly available through either company?

A. The technical assistance available to you will be greatly increased. Kaiser Aluminum—as the nation's largest producer of covered aluminum wire—is already a leader in research and product development, both in the laboratory and in the field. Now, by acquiring additional highly skilled technical personnel, these services will be further strengthened.

Q. How will the new setup affect my delivery date?

A. The convenience of a new eastern plant location, plus additional sales representatives and distributors, will mean even faster and more efficient service.

* * *

The purchase of the Wire and Cable Division of United States Rubber puts into operation the twenty-third plant for Kaiser Aluminum, which started with three plants just ten years ago.

This growth is based on the continued support of our customers, who, working with us, have helped to make Kaiser Aluminum the nation's fastest-growing major producer of aluminum. This latest acquisition represents another step forward in our program of complete service to the nation's rapidly-expanding electrical industry.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Bldg., Oakland 12, California; *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois.

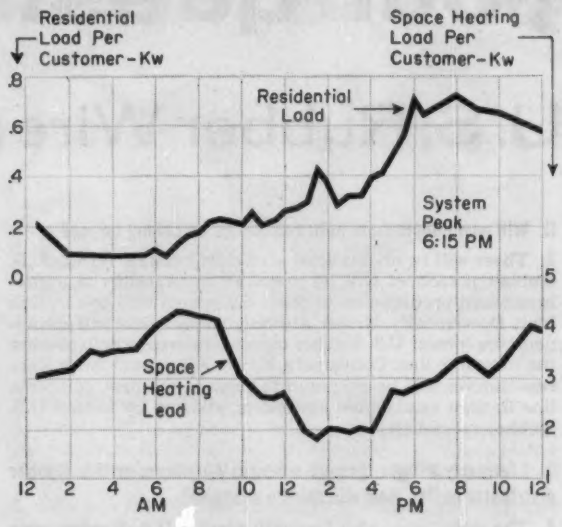
Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

Auxiliary Heating:

Will Utilities Have to Sell the Market?

It looks that way to heating experts who say no one else is technically qualified. Residential and heating load curves at right also show why utilities have a stake



Have utilities been overlooking a big profitable market by failing to sell supplemental and auxiliary electric space heating? Can this kind of electric space heating compete successfully with gas and oil?

These and many other questions were answered with an emphatic "yes!" at a recent auxiliary electric space heating workshop held at Connecticut Light & Power Co. Sponsor was Dittman and Greer Co, Middletown, Conn., distributors for Edwin L. Wiegand Co.

W. L. Thomson of Wiegand Co ran the workshop. He thinks the market is there and auxiliary electric space heating can be sold, and sold profitably. Here's how:

In the first place, the customer must be shown that a thorough understanding of what's involved in a properly installed heating installation. Heat losses must be *accurately* calculated. This is especially true in installations in new rooms being added to his house. The customer must know, not too technically of course, what is meant by heat loss. (This raises the question of who will actually do the selling of auxiliary electric space heating.) The importance of a proper insulation job cannot be overemphasized. This is one of the chief sources of complaints and disappointments. The customer or contractor skimps on the insulation, and the heating system gets the blame. Next, the heat source must be adequate for the job, and must be located at the heat loss.

Operating cost for auxiliary electric heat is subject to the same variable as is central heating. Such factors as house location, prevailing wind direction, the family's living habits, children, etc., all enter the picture. Generally, experience indicates that a safety factor of 15% be allowed above the calculated kwhr consumption. This should be made plain to the customer *before* going ahead with the job.

Who's Going to Sell It?

Who is going to sell the auxiliary electric heat? The contractor and the distributor ordinarily are not qualified. The general thinking at Wiegand and others manufacturers is this: The new salesman, whoever he is, will have to be technically trained. It will not be a matter of the old-time, high-pressure salesman forcing the service on the unknowing, innocent customer. In order not only to sell the customer, but to keep him sold, the salesman will have to go in armed with the basic technical information at his fingertips, and he will have to know how to use it. Who has the man to do this? The utilities . . . ?

. . . And what do the power companies stand to gain with auxiliary space heating? Most of the considerations appear to be good.

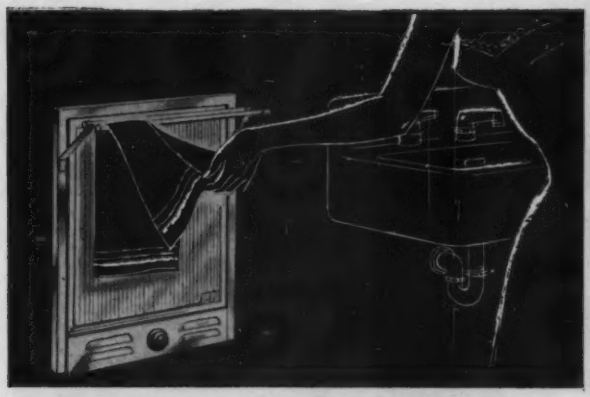
• Auxiliary heat load is purely resistive (forgetting about factional-hp motors in fan units), which is an advantage when using it as a compensating winter load. Also, it is off-peak from the rest of the residential load, which usually peaks during the early evening hours. The electric space heating peak tends to occur in early morning.

• Electric heating, by making customers electricity-conscious, tends to raise kwhr consumption of other electric appliances compared to those in non-electrically heated homes. Surveys indicate that the electrically heated home used about 2½ times the electricity that the non-electrically heated home used, excluding the electric heat.

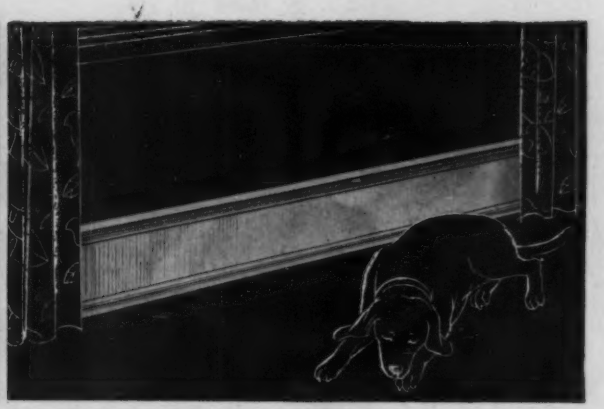
• Diversity and load factor of resistance heating with zone control in homes are good.

• Proper insulation can reduce the heat required in a home 35 to 40% of that in the same home uninsulated. Good practice today calls for installation of heaters not more than 10% in excess of requirements. While this causes the heaters to be energized for longer periods of time, the smaller demands helps to produce a higher load factor which, in turn, improves the annual one.

Because of these considerations, from the standpoint of distribution, utilities on the average must install on their lines from 2 to 2½ kw of residential heating load for every kw of cooling load installed. The speed of the growth of the cooling load indicates the advantages of resistance heating.



SPECIAL UNITS like this panel with night light, drying racks, convenience outlet, are perfect for motels, offices and homes.



BASEBOARD PANELS fit unobtrusively into a room, offer perimeter heat; perfect under large window areas.

PORTABLE HEATERS provide extra heat wherever needed . . . attic, summer cottage, enclosed porch, sickroom.

WALL PANELS are easily mounted, available in various sizes, depending upon the heating job to be done.

4 Popular Ways to Expand ELECTRIC HEATING SALES

One look at these units and you'll see *how*, *where* and *why* glass panel heat is causing such a stir! You can offer radiant glass panel heating at a competitive price to all your customers . . . builders, contractors, engineers or Mr. Consumer. And remember, there are no furnaces, blowers, ducts with this kind of heat to create problems.

READY-MADE MARKETS

Motels—Individual "remote control" thermostats, silent and fast heat, low-cost installation, ease of expansion.

Apartments—All-electric apartments are "naturals" for glass panel heating with its smart appearance, spacesaving, clean, individual room heat.

Offices—Remodeling or new construction, radiant heat gives individual service in extensive or "cubbyhole" areas.

Homes—No ducts, no furnace, no drafts and no maintenance because there are no moving parts to wear out or break down.

When you recommend glass panel heat, be sure to specify *Ra-Grid*® panels by Blue Ridge. For over a dozen years, *Ra-Grid* panels have been giving satisfactory "on-the-job" service. Write for specifications and names of manufacturers who supply the finished units.

BLUE RIDGE GLASS CORP.

BLUE RIDGE GLASS CORP.
KINGSPORT, TENNESSEE

creative IDEAS *in* GLASS

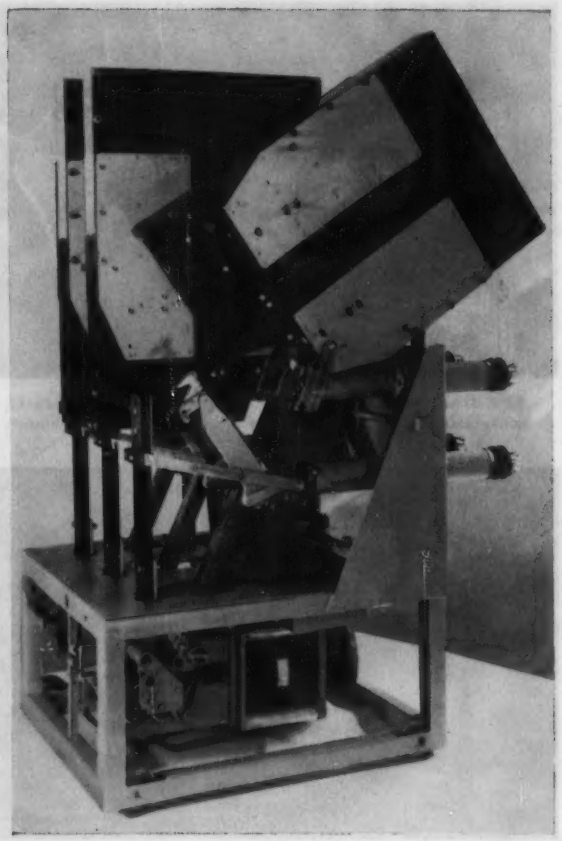
NEW EQUIPMENT

Air Circuit Breaker

The type DST air circuit breaker is intended for 500-mva, 15-kv service and is reported to assure interruption in 5 cycles or less. Interruption is obtained by arc elongation and cooling. A single large puffer serves all three phases and is said to provide fast arc extinction at low currents.

Zirconium-refractory baffle is claimed to combine strong heat-shock resistance, high porosity, and chemical stability under extreme humidity. Racking-in mechanism contains only two moving parts. Hinged arc shutes are said to simplify inspection.

Federal Pacific Electric Co, Eastern Switchgear Division, 888 N. Keyser Ave, Scranton, Pa.



Stringing Sheave

The Model XS-100 universal stringing sheave is designed for use with crossarms up to 5-in. wide and is said to mount securely on either roofed or flat crossarms. The unit features a drop forged connector, a recessed sheave to prevent conductor damage, a spring-loaded hinge plate, and a positive locking head pin. Sheave is 3-in. wide, has 7-in. diam. Reported safe working load is 2,500 lb. Weight is 10 lb. Groove accommodates cable through 1.75 in. diam.

Sherman & Reilly, Inc, First & Broad Sts, Chattanooga, Tenn.

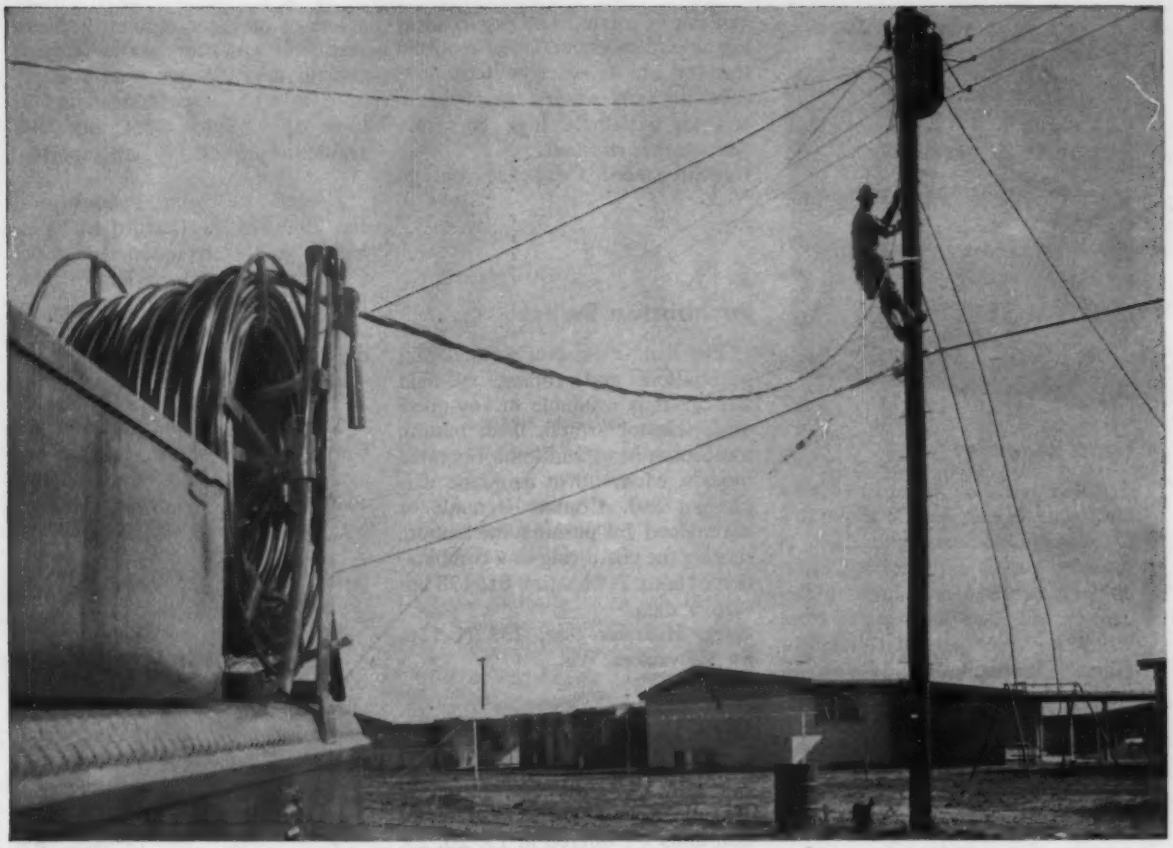
Dual Voltage Transformers

These dual voltage distribution transformers have an externally operated change-over switch to connect the transformer windings for operation at a higher voltage. Designed for systems where a switch to higher system voltage is contemplated, they are said to reduce labor, down time and transformer costs.

Reported to be fully insulated for the highest name plate voltage, they are available in kva sizes from 10 through 167 kva. Primary voltage combinations of 2.4 kv x 4.8 kv, 2.4 kv x 7.2 kv, 4.8 kv x 14.4 kv, and 7.2 kv x 14.4 kv, and standard secondary voltages are obtainable. Losses and preformance are claimed to be comparable to standard transformers.

R T & E Corp, 1900 E. North St, Milwaukee 1, Wis.

(More New Equipment on page 126)



Spinning triplex cable from reel to pole in Plymouth Park, Irvington, Texas. The neat appearance of triplex pleases home owners and builders, and the durable neoprene covers assure long cable service life.

Texas Power & Light Co. extends its service with a million feet of neoprene-covered triplex yearly

Fastening the triplex cable is made easier because neoprene stays flexible over a broad range of temperatures.

Service drops account for a large percentage of the neoprene-covered cable used each year by the Texas Power & Light Company, Dallas. TP&L is using neoprene-covered cable for triplex at a rate of over a million feet annually.

TP&L's first use of neoprene-covered cable dates back 4 years—with no apparent failures of any kind in the neoprene covers in temperatures that range from well over 100°F. in the summer to 10°F. in the winter. Since 1951, TP&L has used more than 5 million feet of neoprene-covered triplex.

You will like neoprene on your triplex, too. Neoprene doesn't get stiff and unmanageable in winter or soft and plastic in the summer. The neutral won't cut it. And neoprene won't be deteriorated by sunlight and weather, nor by the oils and chemicals you may run into in industrial areas.

Ask your supplier about wire and cable jacketed with neoprene, Du Pont's synthetic rubber. He'll be glad to tell you about its many advantages.

NEOPRENE

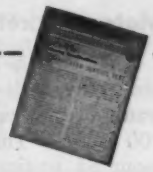
The rubber made by Du Pont since 1932

DU PONT

REG. U. S. PAT. OFF

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

MAIL THIS COUPON TODAY!



FREE! THE ELASTOMERS NOTEBOOK. Every issue contains interesting stories about products made with neoprene. Actual case histories give you the facts about neoprene's longer service life. Clip coupon to get on the mailing list.

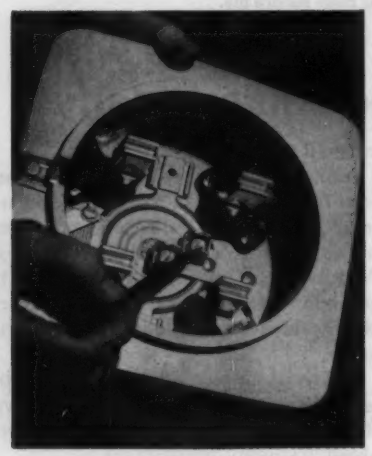
E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. EW-3
Wilmington, 98, Delaware

*Name*_____ *Position*_____
*Firm*_____
*Address*_____
*City*_____ *State*_____

Time Recorder

The Load Log records elapsed load time of an electric apparatus or motor-driven machine such as machine tools, processing machinery, or IBM machines. Meter can be supplied with digits from 999.9 to 99999.9 in hours or minutes. It operates on 115-v 50/60 cps and is adaptable to higher voltages through a resistor or transformer. Catalog No. 592 has complete description.

Capeway Instrument Co, East Bridgewater, Mass.



Meter Socket

This type S-1 square socket is used with single-phase and network watthour meters with ratings up to 100 amp. The socket can be mounted vertically or horizontally and is available with one hub, two hubs, or no hubs. Firth and sixth terminals are said to be easily added. Bus type grounding terminals permit use of different diameter leads and can be rotated 180 deg to allow use of rear knockout. Other reported features are lay-in type terminals, requiring only 45-deg wiring bend, and an extremely high corrosion and weather resistance.

General Electric Co, Schenectady 5, N. Y.

Pushbutton Switch

The Roto-Push is a combination pushbutton and rotary, oil-tight switch. It is available in key-operated, selector switch, flush button, mushroom head and knob operated models, each with a neoprene diaphragm seal. Contact is made or maintained by pushing the button, turning the guard ring or a combination of both. Publication EL-178 has further data.

Cutler-Hammer, Inc, 235 N 12th St, Milwaukee, Wis.

Refrigeration Units

Hermetic, reciprocating refrigeration units are offered in 15, 20, 25, 30, 40, 50 and 60-hp models. Compressor and motor are on a single, hermetically sealed shaft, mounted on vibration isolators on top of the condenser. On 208/220-v supply, increment starters are furnished for all sizes. On 440/550-v supply, across-the-line starters are available on all sizes, increment starters for sizes 25 hp and up.

Units are claimed to have no gas leakage, reduced noise and vibration, and low operating and maintenance costs.

Carrier Corp, Syracuse 1, N. Y.

MORE NEW PRODUCTS

General Plate Div Metal & Controls Corp, Attleboro, Mass., has silver-cadmium oxide top lay **contacts** in strip form and fabricated parts. Strips from $\frac{1}{16}$ to 4½-in. wide, with base metal thicknesses from less than 0.010 to 0.250 are available.

Christie Electric Corp, 3410 W 67th St, Los Angeles 43, Cal., offers a line of hermetic regulated **silicon rectifiers** with continuous capacities up to 1,000 amps at voltages of 6 to 40 v. Operating temperatures of −55 to +65C, and d-c regulation of ±0.5% are reported.

Crystal Research Laboratories, Inc, 29 Allyn St, Hartford 4, Conn., has available an Ionimeter Model CT-21 **water conductivity indicator** for laboratory use. It uses a D'Arsonval meter with direct reading dial calibrated 0 to 50 ppm as sodium chloride.

Mutual Electronic Industries Corp, New Rochelle, N. Y., has available Elasticable, a **stretchable electric cord** for domestic, commercial and industrial use. Available in 2.5, 5 and 10-amp sizes, it is reported to stretch 250%.

Radio Corp of America, Camden, N. J., offers a completely transistorized, 15-lb, 4-channel, **portable amplifier** for closed circuit TV or transmission of remotely originated signals via telephone lines.

General Electric Co, Schenectady 5, N. Y. is marketing a **high-torque, a-c induction motor,** with pushbutton starting, for starting small gasoline engine equipment such as lawnmowers. Available in ratings of 100 ft-oz—NEMA 48 frame—and up to 250 ft-oz—NEMA 56 frame—it operates from 110-v line.

B. E. Wallace Products Co, Exton 20, Pa., has a Magic-Pole, universal **wheel mounted gantry,** with adjustable height and wheel tread. Capacities to 2 tons are available.

Mantec, Inc, 126 Maryland St, El Segundo, Cal., is marketing an automatically controlled, 5-cu ft **multi-environment chamber,** model D-104, said to hold variation within ±2F over a range of −100F to +400F.

Electric Regulator Corp, Norwalk, Conn., offers a transistor-magnetic amplifier **regulator,** Magohm Type STR, to control exciter-excited 400-cps generators. Regulates at 120, 208, or 440 v over range of 380 to 420 cps and reportedly holds output within ±0.5%.

Control Switches for Many Uses:

Circuit Breaker Control
Motor Control
General Control
Manual-to-Automatic Selector
Ammeter Switches
Voltmeter Switches
Power Factor Meter
Wattmeter
Frequency Meter
Regular Transfer
Temperature Meter
Synchroscope

Need rugged Control Switches? See Delta-Star's new line

These new Type M-2 Delta-Star control switches designed for D.C. or A.C. service give you important new features that mean improved operating efficiency and economy.

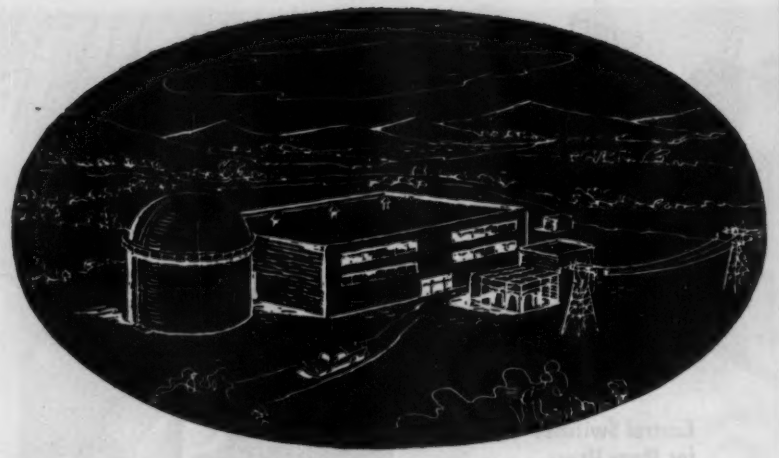
1. **Versatility**—designed for many uses from motor controls to synchroscopes. Switches are rated 20 amps. continuous rating with 250 amp. three-second rating.
2. **Compactness**—only 3⅞ in. high by 3¼ in. wide; new design permits easy wiring, quick inspection.
3. **Rugged and long-lasting**—heavy duty parts; high Delta-Star quality construction.
4. **High interrupting capacity**—single break contacts rated 25 amps. at 250 volts a.c., double break rated 75 amps.

Delta-Star now offers premium control switches at regular prices. Ask your nearby Delta-Star representative or write *Delta-Star Electric Division, H. K. Porter Company, Inc., Chicago 12, Illinois. District offices in principal cities.*

HKP **DELTA-STAR ELECTRIC DIVISION**

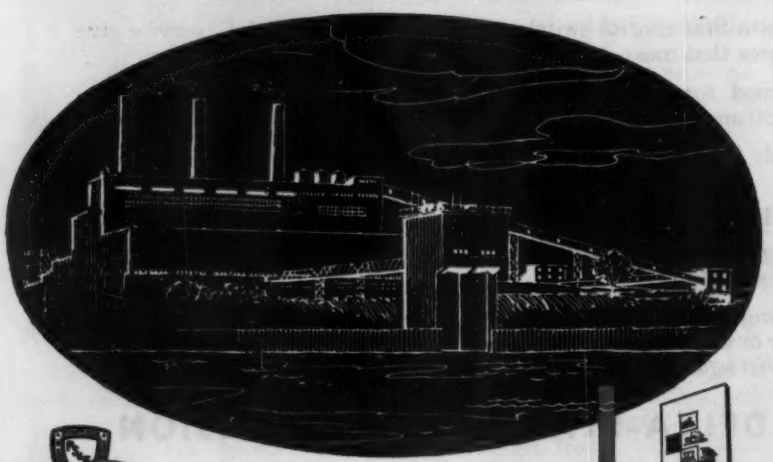
H. K. PORTER COMPANY, INC.

Divisions of H. K. Porter Company, Inc. are: Connors Steel, Delta-Star Electric, Henry Disston, Laclede-Christy, Leschen Wire Rope, McLain Fire Brick, Quaker Rubber, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings.



PUTTING POWER INTO
YOUR EXPANDING PROGRAMS

ATOMIC, HYDRO and FOSSIL FUEL POWER PLANT DESIGN
FOR INDUSTRIALS and UTILITIES



55 YEARS

Pioneer Service & Engineering Co.

221 South La Salle Street • Chicago, Illinois

Send for our descriptive booklet, "Pioneering New Horizons" of these and other services.

CATALOGS & BULLETINS

• **PUSHBUTTON SWITCH:** Data Sheet 116 describes the new turn-to-lock-down lighted pushbutton switch made by Micro Switch Division of Minneapolis-Honeywell Regulator Co, Freeport, Ill.

• **LIGHTING:** Two booklets, one entitled "Fluorescent Lighting Guide Book", and the other, "Bright Ideas for Brighter Living", cover the subjects their titles imply. Published by Sylvania Electric Products, Inc. The first is available from the company's offices at 60 Boston Street, Salem, Mass., and the other from 1100 Main Street, Buffalo 9, N. Y.

• **BUTYL RUBBER:** Thiokol Chemical Corp has announced the availability of its new portfolio on Butyl rubber developments. Write the company at 780 North Clinton Ave, Trenton 7, N. J.

• **PNEUMATIC LOADING STATIONS:** Bulletin No. 1031 describes a new line of auto-manual pneumatic loading stations of the non-seal type manufactured by Copes-Vulcan Division, Blaw-Knox Co, Erie 4, Pa.

• **TAPES:** A 4-page catalog covers the complete line of Bull Dog brand friction, rubber and plastic tapes available from Boston Woven Hose & Rubber Co, Boston 3, Mass.

• **THERMOSTATS:** An 8-page engineering data book covers the line of pre-calibrated thermostats for various industrial and safety applications made by Franklin-Dales Co, 180 E. Mill Street, Akron, Ohio.

• **PRESSURE TRANSMITTER:** Bulletin 501 describes the low-differential pressure transmitter manufactured by Burgess-Manning Co, Penn Instruments Div., Philadelphia 4, Pa.

• **ELECTRICAL ALUMINUM:** A 12-page booklet reportedly covers all the important uses of aluminum in electrical applications. Published by Reynolds Metals Co, 2500 South Third Street, Louisville 1, Ky.

• **TRUCK LIFT:** A brochure describes the "HI-Reach" lift, model EE-60, manufactured by Elliott Mfg Co, 503-7 Redick Tower, Omaha 2, Neb.

• **THERMOPLASTIC EXTRUSION:** Product Information Bulletin No. 1029, "Fundamentals of Thermoplastic Extrusion", provides basic information on extrusion equipment, extrusion processes and theories applying to most extruded thermoplastics. Available from Monsanto Chemical Co, Plastics Division, Springfield, Mass.

• **AIR BREAK STARTERS:** The manufacturers new EC&M Type ZHA air break starters, 2,200-4,800 v, for squirrel-cage, synchronous and wound-rotor motors are described in a 4-page flyer. A companion line of oil break starters is also covered. Write Electric Controller & Mfg Co, 4500 Lee Road, Cleveland 28, Ohio

• **WEATHER SCIENCE:** The role that weather may play in the solution of various industrial, commercial and marketing problems is told in a brochure, "Weather Engineering for Profit", issued by Weather Corp of America, 611 Olive Street, St. Louis 1, Mo.

TECHNICAL LITERATURE

CANADIAN STANDARDS—The 1957 List of Canadian Standards Association Publications is now available. This 18-page booklet contains 342 standards, 125 of which concern electrical engineering. Available on request from Canadian Standards Assn, 235 Montreal Road, Ottawa 2, Canada.

BRAZING FILLER METAL—A tentative specification prepared jointly by American Welding Society and the American Society for Testing Materials is entitled, "Tentative Specification for Brazing Filler Metal." The publication gives such information as chemical composition, mechanical properties, and standards forms, sizes and tolerances. Also contains an appendix which classifies brazing filler metals. Available from either American Welding Society at 33 W. 39th Street, New York 18, N. Y., or American Society for Testing Materials, 1916 Race street, Philadelphia 3, Pa.

BRITISH SHORT-CIRCUIT TESTING—ASTA Publication No. 1 is the designation given a brochure which describes the Association of Short-Circuit Testing Authorities, Inc, in Great Britain. The brochure, which will be of interest to American manufacturers who have their equipment designed for high IC and subsequently have it tested in England, covers the operation of the Association as it relates to proving electrical equipment. The facilities for the testing are also described. Write Association of Short-Circuit Testing Authorities, 36 Kingsway, London WC 2, England.

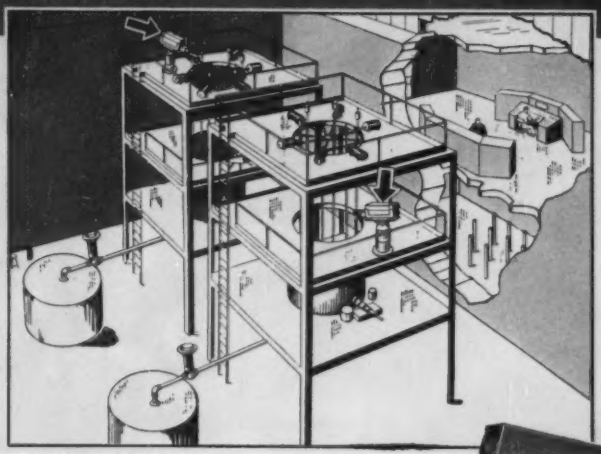
HIGH TEMPERATURE PROBLEMS—Engineers associated with the design and operation of high-temperature equipment in processing plants may be interested in a reprint now available from B & W's Tubular Products Division entitled, "High-Temperature Problems in Process Plants." It discusses steel and its alloys and their mechanical and physical reactions under various temperature and corrosive environments. Free, ask for reprint No. TR-544 from Babcock & Wilcox Co, Tubular Products Division, Beaver Falls, Pa.

TELEMETERING SYSTEMS—A paper entitled, "Telemetering Systems and Their Uses," describes the changes in the status of telemetering systems from useful tools to industrial and commercial necessities. Types of systems, their uses, operation, and details are covered. Written by E. Wylie Head, Control Corp, 719 Central Avenue NE, Minneapolis 14, Minn.

ELECTRICAL INSULATING MATERIALS—"Symposium on Minimum Property Values of Electrical Insulating Materials", ASTM Special Technical Publication No. 188, is now available. The symposium serves as a starting point from which further research may help solve some of the problems associated with electrical insulation. Syposium includes several papers which answer some of the requirements for determining such properties as minimum property value of electrical insulating materials; dielectric break-down effect; minimum quality levels; variability of dielectric breakdown in sheet insulation; low temperature resistance test methods for non-rigid insulation; and others. Price $1.75. Write American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

Diamond "UtiliVue" (WIRED TELEVISION)

used in NUCLEAR REACTOR STUDIES at Battelle Memorial Institute



Arrows indicate remotely controlled "UtiliVue" Cameras that SEE experimental nuclear reactor cores.

"UtiliVue" pedestal enables camera to be rotated 320° and tilted 90° by remote control from console. Zoom lens (also controlled from console) brings objects into focus at widely varying distances from camera.

"UtiliVue" Monitor is built into control console in separate control room where experimental nuclear reactor cores can be WATCHED in perfect safety.

The "UtiliVue" is invaluable whenever there is the need for actually SEEING what is happening where it is impossible or impractical for the human eye to watch directly. There are installations of Diamond Industrial TV that have been in continuous operation since 1946. For further information, get in touch with your Graybar Distributor or use the coupon below.

7406

DIAMOND POWER SPECIALTY CORP.
"FIRST IN INDUSTRIAL TELEVISION"
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LANCASTER, OHIO

Please send me without obligation a copy of new bulletin showing how Diamond Industrial (Wired) Television will help me reduce costs, improve quality, increase sales and aid safety.

Name_____

Title_____

Company_____

Address_____

Ohio Brass Is New Capacitor Producer

A new line of shunt capacitors for power factor correction is being produced by Ohio Brass Co, Mansfield, Ohio. The capacitors meet all accepted national standards for kvar ratings, voltage range and dimensions, according to a company spokesman. In addition to the individual capacitor units of 25 and 50 kvar, standard equipments and accessories are available for pole mounting and for stacking in substations and elsewhere.

Four years of research by O-B engineers preceded perfection of the new capacitor design, noted the spokesman. In addition, Ohio Brass had a working arrangement with ASEA of Sweden (Swedish General Electric Co) which gave it the benefit of ASEA's design and manufacturing experience in the capacitor field. Similar arrangements worked successfully in developing Thorex lightning arresters and the O-B line of condenser-type ASA standard bushings.

A completely new factory department—mechanized, air conditioned, and including more than a million-dollars worth of processing and testing equipment—has been set up to handle capacitor production.

Seen in the picture above, a "typical assembly line crew" handles the packaging of some of first units to leave the production line. Company President Roger A. Black lowers a 50-kvar capacitor into its carton, assisted by Factory Manager E. C. Thompson. Observing at the left are Paul M. Ross, manager of power equipment sales; and J. T. Lusignan, executive engineer. Watching closely at the right is Wade H. Burleson, manager of power utilities sales.

L-M Plans New Lab for Engineering Research

Plans for a new engineering research laboratory were announced recently by President R. G. Wheaton, Line Material Industries, McGraw-Edison Co, Milwaukee. Construction of the new 20,000-sq ft laboratory, to be erected at a cost of about $1 million, will start this year. Its principal work will be short-circuit testing of new L-M and McGraw-Edison products, and it is expected to be operating by 1959. Such testing is presently being conducted in the "Know House" of L-M's Central Plant at South Milwaukee.

Wheaton said, "Our products will soon approach interrupting levels that will require higher test capabilities. The new laboratory will then replace the present "Know House."

Burndy Corp Expands Field Engineering Group

Burndy Corp, Norwalk, Conn., has doubled its two-man field engineering group in the Utility-Industrial Division. The expansion is aimed to make the company's technical service on problems of electrical connectors, connection methods, and installation tools more fully available to representatives and customers.

Appointments are: Richard Harap, chief field engineer; James T. Gale, senior field engineer; Henry Shavel and Jerom S. Penzner, field engineers.

Riley Stoker Subsidiary Enlarges Fabricating Plant

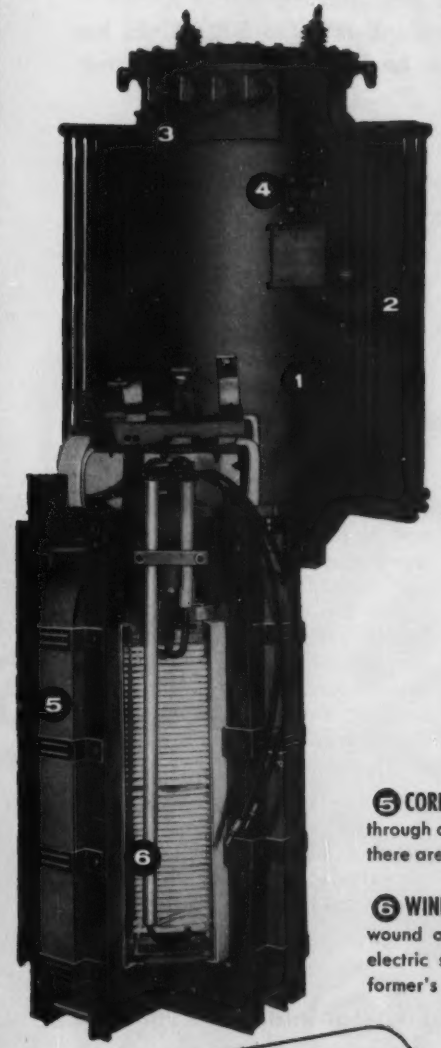
Expansion and modernization of the Badenhausen Corp plant at Cornwells Heights, Pa., is making steady progress toward completion in late spring or early summer. This boiler manufacturing subsidiary of Riley Stoker Corp, Worcester, Mass., is now constructing a new tube fabrication building, 70 ft wide by 600 ft long. About 700 ft of yard craneways are being built. The plant will be equipped for superheater, reheater and economizer tube fabrication. Three new cold bending machines and one hot bending machine for close radius work are part of the equipment.

New automatic welding equipment, X-Ray equipment and improved electrical distribution facilities are being provided, as well as modernized heating, ventilating and lighting.

(More M&M on page 132)

Wagner Form W Substation Transformers

...in ratings through 500 kva, voltages to 67,000



Wagner Form W Transformers are available for every requirement of modern distribution systems—from 3 to 500 kva, with high voltages from 480 to 67,000 volts. In all ratings you get the excellent performance and complete dependability for which Wagner Transformers have been noted for 65 years . . . plus the compact design and light weight that makes Wagner Form W Transformers easy to handle and install.

Check these important features of 250 to 500 kva ratings:

1 HOUSED IN ROUND TANKS . . .
inherently strong . . . compact . . . light in weight.

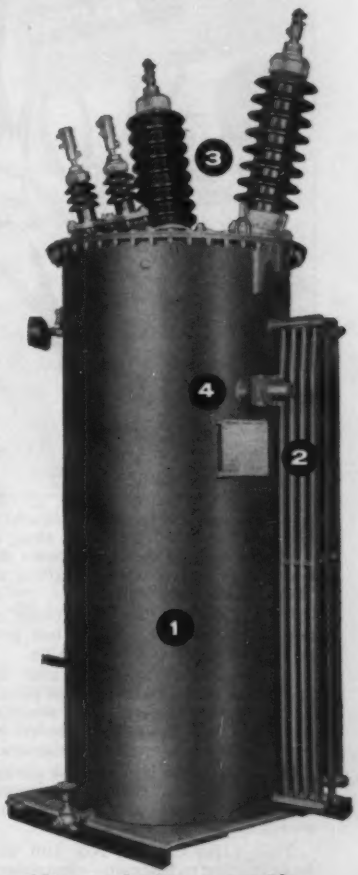
2 ELLIPTICAL TUBE RADIATORS
for efficient cooling . . . provide maximum radiating surface in minimum space.

3 BUSHINGS
ASA standard high voltage bushings on transformers 23 KV and above (right). Locked tank wall bushings on transformers with low voltage ratings, 600 volts and below, (left).

4 WEATHER-PROOF, TAMPER-PROOF TAP CHANGERS . . . operating handle is protected by cover which shows tap position . . . can be padlocked.

5 CORES are of cold-rolled, oriented grain steel, wound through and around the coils. In ratings from 250 to 500 kva, there are 4 core sections spaced 90° apart.

6 WINDINGS . . . high voltage and low voltage coils are wound on insulating cylinders of high mechanical and dielectric strength . . . the winding best suited to each transformer's rating, voltage and current is used.



Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner maintains a nationwide organization to provide fast, convenient service with branches in 32 principal cities.

56-15

Wagner Electric Corporation
EST. 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES · AUTOMOTIVE BRAKE SYSTEMS-AIR AND HYDRAULIC

NEW
KLEIN
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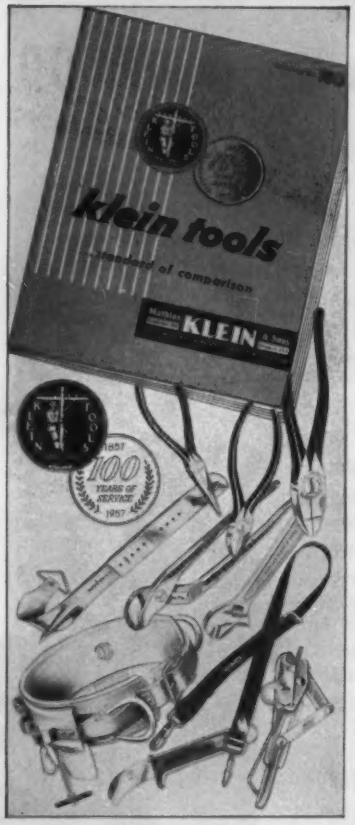
FOR
• LINEMEN
• ELECTRICIANS
• INDUSTRY



100 years ago in 1857, Mathias Klein opened a little forge shop in Chicago. Out of this has grown the national institution known as Mathias Klein & Sons.

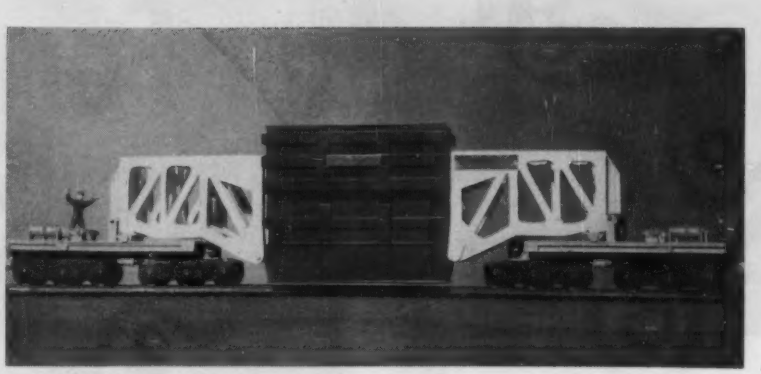
To dramatize this 100 years of service to industry, Klein has prepared a completely new catalog.

It contains illustrations and descriptions of the wide range of pliers, grips, climbers, belts, safety straps—the tools and equipment needed by linemen, electricians and industry.

A new feature is a section giving the dimensions of each plier—length of handle, length of cutting knives, width of head, size of point, etc.

This Klein Catalog No. 100 will be of interest to linemen—electricians—good workmen everywhere. A copy should be in the hands of every purchaser of good tools. Write for yours.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS



"Three-Part" Railroad Car

. . . to transport large power transformers up to 500,000 lb, has been designed by Westinghouse, to be into operation this summer

A "three-part" car for carrying transformers has been designed by Westinghouse Electric Corp. This is a further advance in railroad transportation for such large power equipment (EW, Feb. 2, 1953, p 23).

The 12-axle car, first of its kind in the nation, said John Chiles, Jr, manager of the company's transformer division, will be placed in operation early this summer. It is being built by Greenville Steel Car Co, Greenville, Pa.

This three-part car has one part as the actual load that it carries. Other two sections are identical, each about 30 ft long. Each section consists basically of an underframe with trucks on which is mounted a steel truss. The transformer is suspended between the two trusses, thus forming the "three-part" car.

The unique carrier has a load capacity of 500,000 lb, and will transport a transformer 28 ft long and 12 ft wide. Over-all car length would be about 90 ft.

Primary benefit of the new car, Chiles indicated, is that the transformer can be lowered to within 6 in. of the rails. A heavy-duty car now used has about a 30-in. clearance. "By taking advantage of this extra clearance, we can now ship many large units in one piece instead of splitting the top section", said Chiles. "This will result in reduced installation costs and delivery time for our customers", he continued. "Only minor changes will be required in construction of transformers to be shipped on this car", he added.

For the return trip of the unloaded car, the two end sections are hooked together and returned as a conventional car over any roadbed by the shortest and fastest means available.

Porter to Build Plant For Electrical Equipment

H. K. Porter Co Inc, New York, will erect a plant to manufacture electrical equipment on a 138-acre site in Union City, Tenn., according to a company spokesman. Among products to be manufactured there will be switchgear, protective devices, and transformers. The Tennessee plant is expected to be completed in mid-1958.

The Delta-Star Electric Division has plants in Chicago and Philadelphia. It manufactures heavy duty electrical equipment for utilities and industry, as well as aluminum conductor systems, lighting arresters and hydraulic ladder mounts.

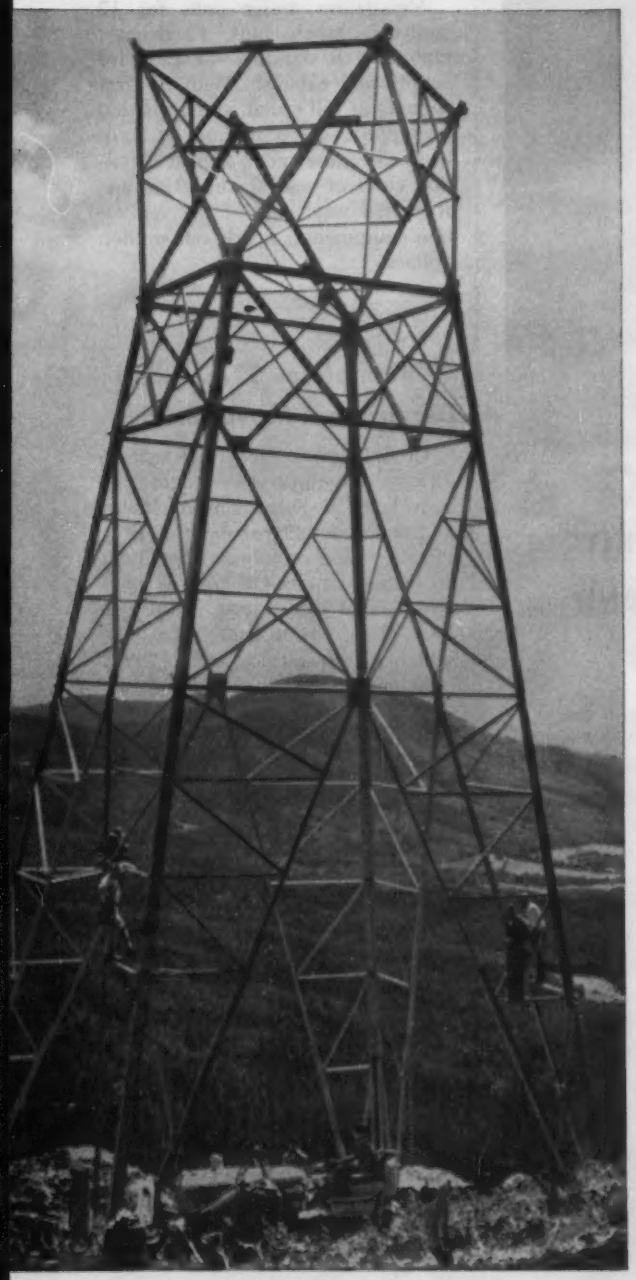
First Baltimore Fan Finished

The first of 32 high-powered ventilation fans for the Baltimore Harbor tunnel has been completed in Dearborn, Mich., by the American Blower Division of American Standard. Fans have a wheel diameter of

(Continued on page 134)

By building towers lighter with USS MAN-TEN Steel . . .

You can save on erection costs



—and the tougher the terrain the more you'll save

THE INITIAL COST of steel in a transmission tower is small compared to the cost of erection. This is especially true when your lines run through remote and rugged country. Then, every unnecessary pound of weight takes its toll—makes transportation to the site more difficult and erection more costly.

That's why it's so important to keep tower weight to a minimum.

You can do it safely and at low cost with USS MAN-TEN Steel. Used in the tower legs, cross arms and bracing members under compression, the high yield point (50,000 psi) of USS MAN-TEN Steel makes it possible to materially reduce the size and weight of these parts without any sacrifice of strength and durability.

Despite the fact that USS MAN-TEN Steel is 50% stronger than structural carbon steel, has greater abrasion resistance and has 40% higher fatigue strength, it costs only a little more. That's why its use for reducing weight in tower construction is not only eminently practical but economical as well. That's why USS MAN-TEN Steel is being used in some of the most important power lines in the country.

You will find our 174-page "Design Manual for High Strength Steels" very helpful in applying USS MAN-TEN and our other famous high strength steels, USS COR-TEN and USS TRI-TEN "E," to your designs. For a free copy, write on your company letterhead to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

GOING UP! Tower assembly and erection are speeded up when weight is kept to a minimum with USS MAN-TEN Steel construction.

UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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USS HIGH STRENGTH STEELS

1933 USS HIGH STRENGTH STEELS 1957 — UNITED STATES STEEL — 24 YEARS OF PERFORMANCE

USS MAN-TEN • USS COR-TEN • USS TRI-TEN "E"

UNITED STATES STEEL

7-643

The durability and utility of this kit meets the challenge of rugged truck and field first aid requirements.

M-S-A® ALL-WEATHER FIRST AID KITS ASSURE EFFECTIVE TREATMENTS AND DRESSINGS FOR EMERGENCIES

No matter how much time this kit spends on the truck, you can always open it with the same assurance of purity and sterility as the day it left our plant. Here's why.

The snug fit of the tubular rubber gasket in the All-Weather Case excludes dust and moisture. Unit packages are individually wrapped in cellophane with tear tapes for quick opening. Our exacting Quality Control program guarantees pharmaceutical reliability of every dressing and medication.

The kit is specifically designed for on-the-job use. The smooth durable blue enameled case and the unit packages are easily identified in emergencies. The packages extend from the opened case for easy removal.

Call in your MSA man now for more details and a demonstration of this kit.

MSA
SAFETY EQUIPMENT HEADQUARTERS

Call the MSA man on your every safety problem . . . his job is to help you

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 82 Branch Offices in the United States & Canada

First Baltimore Fan

(*Continued from page* 132)

approximately 8 ft. and are driven by two GE induction motors, one for high-speed, peak-load operation, the second a 2-speed motor for medium and low-speed operation.

Ventilation design calls for 12 fresh air supply fans, 12 exhaust fans, and 8 standbys—4 each for supply and exhaust. With 24 fans running at full speed, system is said to supply over 3 million cu ft of fresh air and remove almost 3 million cu ft of stale air each minute. Reported total cost of the ventilation equipment is nearly one million dollars.

GE Completes $27 Million Department Move to Erie

Completion of General Electric's $27 million three-year program to consolidate its Direct Current Motor and Generator Department at Erie, Pa., has been announced by Oscar L. Dunn, department general manager. "The department is fully in Erie about six months ahead of schedule," he said.

Dunn revealed that to locate the department in Erie, the company has invested close to $16 million in facilities—consolidating operations here that were formerly located in Lynn, Mass.; Fort Wayne, Ind.; and Erie. In addition, approximately $11 million was spent in training personnel and for other expenses related to the move.

In total, GE expended approximately $11,000 per employee in establishing the department at Erie, Dunn said.

Employment in the department is currently over 3,800, representing a weekly payroll in excess of $375,000. This compares with employment of 2500 a year ago.

Guth Has Gratelite

Edwin F. Guth Co has introduced the Prismoid Gratelite, a "reversible louver-lens" for fluorescent and slimline lamps. The St. Louis, Mo., manufacturer is celabrating its 55th anniversary this year.

New General Electric Boiler Feed Pump Motors

To obtain maximum reliability and economy . . .

D. P. & L. Installs Six 1000-hp General Electric Boiler Feed Pump Motors

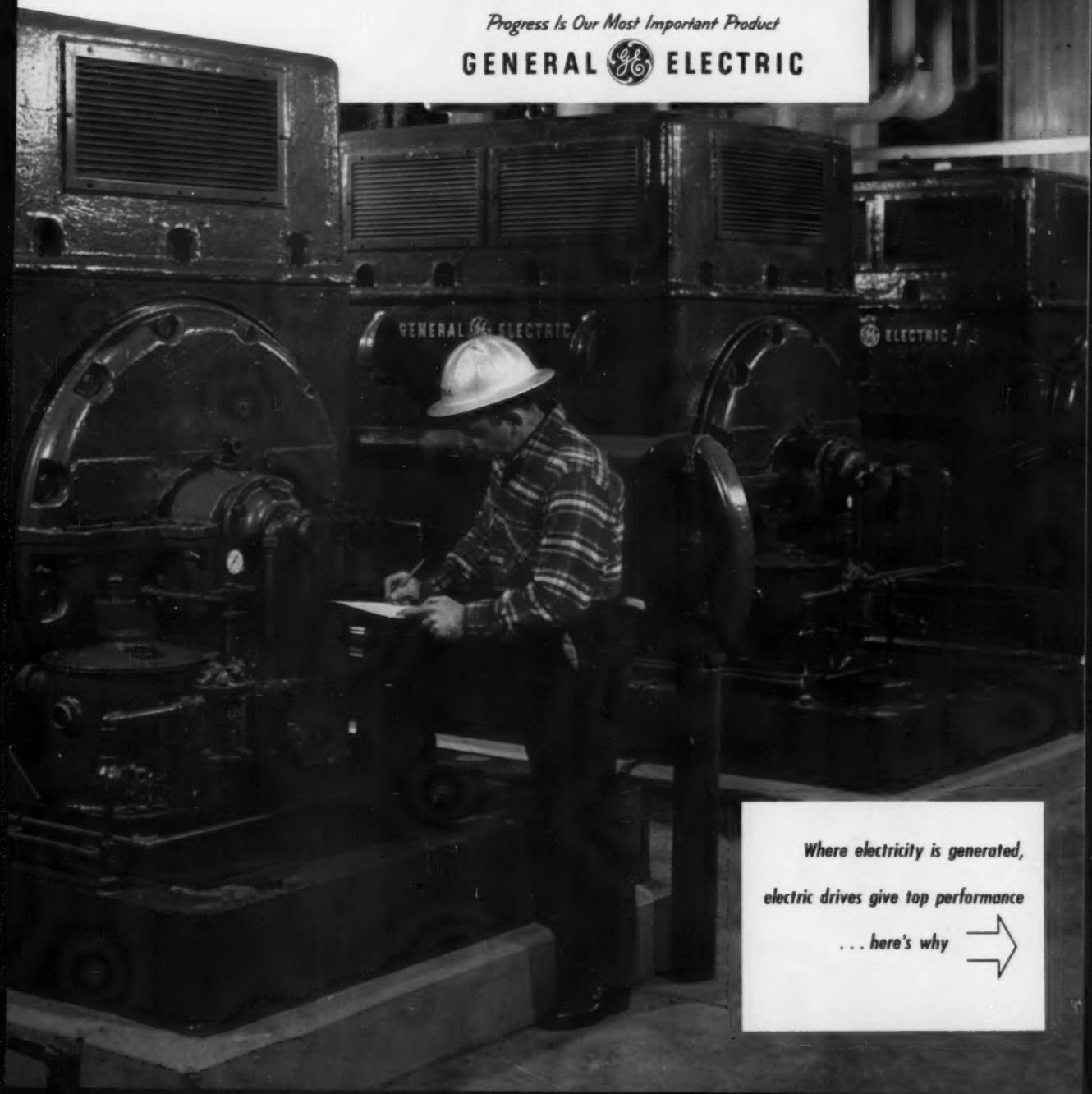
Six new General Electric Boiler Feed Pump Motors at Delaware Power & Light Company's Delaware City Power Station help provide power and steam for a new petroleum refinery with the largest initial capacity ever built. These G-E motors help generate up to 1,500,000 pounds per hour of superheated steam at 1,300 psig to provide Tidewater Oil Company's huge Delaware Flying 'A' Refinery with both electricity and process-steam required to refine 130,000 barrels of crude oil per day.

New General Electric boiler feed pump motors help provide the reliability and economy needed in Delaware City Power Station's boiler operation. These motors utilize a new bearing system to reduce maintenance. New ventilation system permits close motor mounting, improves employee comfort. Revolutionary Polyex® insulation system lengthens motor life up to 100%. Improved rotor and stator and new acoustic treatment provide reliable, continuous, quiet operation.

Progress Is Our Most Important Product

GENERAL ELECTRIC

ELECTRIC DRIVES FOR THE ELECTRIC INDUSTRY



Where electricity is generated, electric drives give top performance . . . here's why

ELECTRIC DRIVES FOR THE ELECTRIC INDUSTRY

New General Electric Boiler Feed Pump Motors are acoustically treated for quiet operation

For improved employee comfort and efficiency, new General Electric Boiler Feed Pump Motors are sound-engineered for quiet operation. New rotor and fan design cuts aero-dynamic noise. Unique rotor and stator pole slot combinations reduce magnetic noise. A new, acoustically treated top hat muffles operating noise to reduce the high-pitched whine often characteristic of large, high-speed boiler feed pump motors.

FOR MORE INFORMATION on G.E.'s new, quiet-operating boiler feed pump motors, write Section 882-2, Medium A-C Motor and Generator Department, General Electric Co., Schenectady 5, N. Y.

REMOVABLE TOP HAT is designed with a series of chambers and baffles which can be lined with layers of sound absorbing materials. Motor noise is channeled up into top hat where it is dissipated by acoustically treated panels.

IMPROVED ROTOR manufacturing techniques and new fan design of General Electric's boiler feed pump motor reduce operating noise at the source. Air deflectors at each end of rotor smooth air flow for further noise reduction.

Progress Is Our Most Important Product

GENERAL ELECTRIC

ELECTRICAL BUSINESS OUTLOOK

Electrical World
MARCH 25, 1957

Forecasts for residential load increases get backing from a Federal Reserve Board study undertaken in January and February with University of Michigan's Survey Research Center. The survey reports consumers will match last year's spending, which resulted in retail appliances sales of $8.4 billion and helped to boost residential energy sales by 11%.

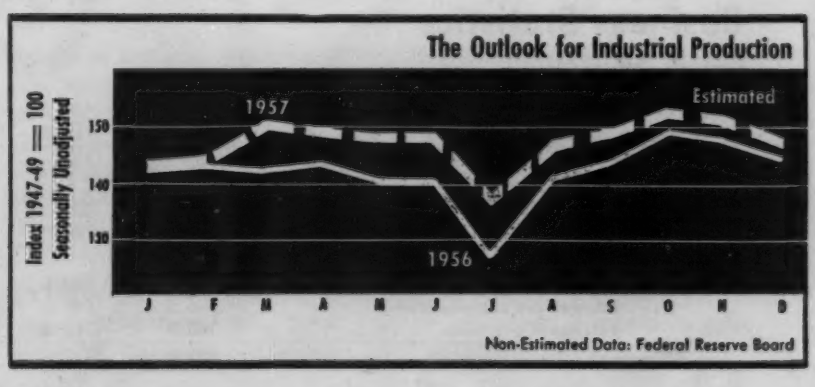
Here are consumers' buying plans for the next year: 28.8% plan median expenditures of $300 for major appliances and furniture compared with 28% and $290 in 1956; for home improvement and maintenance, 24% will spend a median $460 vs 22.2% and $370 last year.

And their outlook for the future remains optimistic. Consumers expect to be earning more—40% anticipate higher incomes a year from now while only 7% look for less. "Good times" are expected by 60% of the FRB's sample of 2,700 U. S. families; 13% are pessimistic.

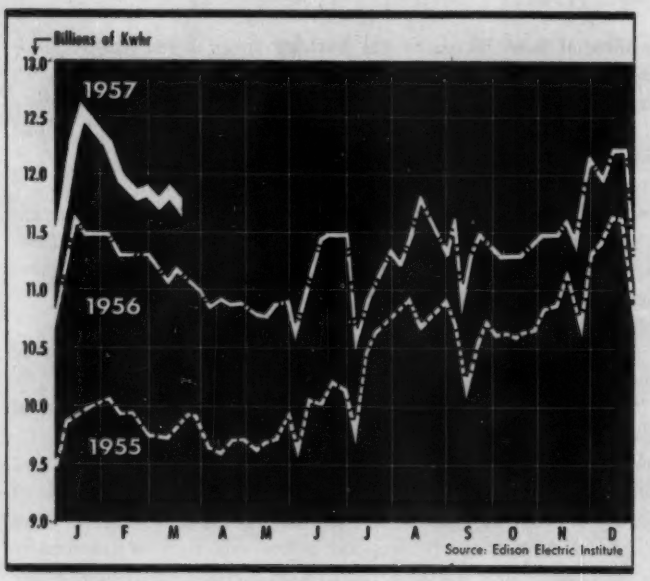
Housing starts remain the big weak spot. The FRB report says only 8.4% of consumers expect to buy new or used homes this year compared with 9.4% in both 1955 and '56. February starts dropped below one million (seasonally adjusted) for the first time since 1952, a recent Commerce Department study reveals. Much of the lag shows up in South and West—areas that have voiced some of the loudest complaints about tight money.

Industrial modernization and expansion resulting in increased kwhr use per manhour continues its upward swing. Spending on new plant and equipment will be higher than last year, according to another Commerce survey. But the rate of spending may taper off in the second half, the department reports. Capital investment is estimated at $37.4 billion for 1957 compared with $35.1 billion last year. Annual rate this quarter is scheduled at $38 billion, indicating we may be riding the peak for this year.

Most capital spending increases for '57 show up for large companies, the Commerce report shows. The drop in spending among smaller companies probably reflects difficulties they've run into financing capital investments. Durable goods manufacturers plan to raise outlays for the year by 11.5%, even though the auto industry will cut spending by about one-fourth. Both public utilities and railroads are scheduled for roughly a 25% increase; commercial enterprises will cut back by about $700 million for a 6% decrease.



STATISTICS



OUTPUT
Week ended March 16, 11,650,000,000 Kwhr Up 4.0%

Per Cent Change From Previous Year

	Mar. 2	Mar. 9	Mar. 16
Total U. S.	+ 5.3	+ 6.6	+4.0
New Eng.	+ 3.9	+ 3.3	+1.1
Mid Atlan.	+ 3.1	+ 4.0	+0.0
Cent. Ind.	+ 6.5	+ 7.1	+4.0
West Cent.	+ 9.1	+ 9.7	+7.0
Southeast	+ 5.9	+10.8	+5.2
South Cent.	+11.9	+10.3	+9.4
Rocky Mount.	+ 2.5	+ 7.0	+5.9
Pacific			
NW	− 4.9	− 4.7	+0.5
SW	+ 6.0	+ 4.2	+5.4

Seasonally Adjusted Index 223.5
Week Ago 227.7
Year Ago 214.9

Atomic Energy Commission requirements—1,150,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 4.2%.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Dec.	120.44	119.91	114.47	5.2
Peak—Class 1 Systems. million kw	Dec.	102.8	101.2	98.3	4.6
Estimated Dec. '57 Peak	Dec.	114.5	114.8	112.6	1.7
Production—billion kwhr	Dec.	52.88	50.65	50.82	4.1
Hydro		10.00	9.31	9.34	7.1
Fuel		42.88	41.34	41.48	3.4
Sales—billion kwhr	Dec.	47.46	45.78	45.15	5.1
Residential		13.22	11.66	12.31	7.4
Commercial		7.34	7.20	6.80	7.9
Industrial		24.44	24.51	23.70	3.1
Other		2.47	2.41	2.33	6.0
Fuel Consumption	Dec.				
Coal—million tons		14.73	14.03	14.81	−0.5
Oil—million barrels		8.22	7.13	8.55	−3.9
Gas—million cu ft		82.17	88.73	69.85	17.6
Net Income Class A & B Co's—$million	Dec.	132.82	102.54	124.95	6.3
Residential Customers—millions	12 mos.	45.71	45.62	44.41	2.9
Revenue per kwhr	ended	2.60¢	2.60¢	2.64¢	−1.5
Avg kwhr per customer	Dec. 31	2,969	2,942	2,751	7.9
Avg annual bill		$77.19	$76.86	$72.63	6.3

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Feb.	146	146	143	2.1
ENR Construction Cost	Mar.	148.6	148.9	142.6	4.2
BLS Cost-of-living	Jan.	118.2	118.0	114.6	3.1
New Orders for Machinery (1950 = 100)	Jan.	152	138	135	12.6
NEMA Sales					
Insulation materials	Jan.	154	139	159	−3.1
Electric appliances		96	84	105	−8.6
Wholesale prices	Dec.				
Motors and generators		140.6	140.1	126.5	11.1
Transformers and regulators		146.6	146.6	131.2	11.7
Switchgear and fuses		163.9	164.4	147.5	11.1
GNP—annual rate—$ billion	4th Qtr.	423.8	413.8	397.3	6.7

MANAGEMENT BULLETIN

FINANCE

New security offerings of electric utilities continued at a high level last week. Halsey Stuart & Co group wins $29 million Appalachian Electric Power Co first mtg 4⅝% bonds (A) due 1987 with a bid of 100.58%; reoffers at 101.22% to yield 4.55% . . . Baltimore Gas & Electric Co stockholders are getting rights to subscribe to 577,883 common shares on 1-for-11 basis, record March 19 to expire April 3 at $31 a share. First Boston Corp is the underwriter . . . Colorado Central Power Co is offering 74,175 common shares through rights on a 1-for-3⅓ basis, record March 4 to expire April 2 at $22.50 a share. First Boston Corp is the underwriter . . . Dillon Read & Co and Dean Witter & Co are offering $7 million Hawaiian Electric Co first mtg 4.70% bonds (A) due 1987 at 100% to yield 4.70% . . . Savannah Electric & Power Co is offering 163,334 common shares to stockholders on a 1-for-6 basis, record March 18 to expire April 1, with an oversubscription privilege at $18 a share. First Boston Corp and Stone & Webster Securities Corp are the underwriters. (See page 19 for later financial items.)

Houston Lighting & Power Co sets a price of $43 a share on its 612,260 common share offering to stockholders on a 1-for-10 basis, record March 25 to expire April 15 with an oversubscription privilege, without underwriting.

New financing planned. Portland General Electric will sell 300,000 common shares and $10 million bonds by mid-year . . . Utah Power & Light Co will market 400,000 common shares and about $15 million bonds late this year.

Florida Power & Light Co has issued its "Facts and Figures" booklet for 1947-56. For copy, write Harry E. Simpson, Florida P&L, Miami, Fla.

CONSTRUCTION

Companies continue to budget large expenditures for future growth. Most recent are: Southern Co system, $436 million in 1957-59 period; Utah Power & Light Co, about $46 million in the same period; Eugene, Ore., Water & Electric Board, about $1.5 million for underground power lines in downtown area; Northern Indiana Public Service Co, $59 million in 1957-58; Ohio Power Co, nearly $70 million in 1957; Mississippi Power Co, $125 million for next five years, and South Carolina Electric & Gas Co, over $61 million for 1956-57.

Alabama Electric Cooperative, Inc, is planning to build another unit of 22,500 kw at its Gantt steam plant. Bids have been requested by April 6.

Plan of the Eastern Iowa Light & Power Cooperative, Wilton Junction, Iowa, and the City of Muscatine calls for each to build a 22,000 kw steam plant with completion dates in 1959. Agreement permits co-op to defer completion of its second 22,000 kw unit until about 1964. These arrangements will enable both the co-op and the City of Muscatine to meet their estimated power requirements until 1969.

LEGISLATION

A bill to authorize the Vermont Public Service Commission to build, operate, and maintain transmission facilities for St. Lawrence power was introduced in the legislature recently. Proposed legislation would authorize the state to issue bonds to pay for the lines to transmit 100,000 kw from the New York State Power Authority to load centers within Vermont. Bonds would be paid off with proceeds from sale of power. They would also be a general obligation of the state. PSC Chairman Oscar L. Shepard has strongly opposed this proposal and contends these facilities can be built at less cost by private enterprise.

A bill to prohibit utilities and other firms not regularly engaged in the selling of merchandise from selling articles to its employees at wholesale prices was passed by the House of Oklahoma. Bill had previously been amended to permit

utilities to advertise and display appliances. Bill also prohibits persons from advertising merchandise at wholesale prices "unless he actually is selling at wholesale prices."

ANNUAL REPORTS

Annual reports keep coming in. Pacific Gas & Electric Co boasts four-color cover and insert. All color pictures show PG&E men at work . . . Utah Power & Light Co annual report has attractive full color painting of line crew at work . . . Detroit Edison Co report carries illustrated chart that shows where the revenue dollar goes . . . Kansas Power & Light Co report has several charts which help sketch in the economic background of its service territory . . . Virginia Electric & Power Co devotes the inside back cover to story of the Jamestown (Va.) Festival which begins April 1 . . . Louisville Gas & Electric report has convenient lead-ins to help reader locate content in president's letter . . . Idaho Power Co has full two-page spread charting "Forty years of company growth and a 10 year forecast."

PUBLIC RELATIONS

The 1956 "Finer Carolina" contest sponsored by Carolina Power & Light Co names Asheboro, Ramseur, and Hot Springs as first-place winners. "Scrapbooks submitted to the judges reflect a gratifying urge for civic improvements," commented Pres Louis V. Sutton. "Because we feel that our contest has played some part in stimulating this competitive spirit for local betterment, we are now sponsoring the "Finer Carolina" contest for the sixth consecutive season," he said.

AREA DEVELOPMENT

Utility companies which relate their facilities to other vital community costs may want a copy of "Municipal Costs and Revenues Resulting from Community Growth," by Walter Isard and Robert Coughlin of the University of Pennsylvania. Authors examine new industrial and residential growth in terms of required community and utility services. For copy, write Chandler-Davis Publishing Co, Box 231, Wellesley 81, Mass. Price is $5.

ACQUISITIONS

Virginia Electric & Power Co has purchased the Roanoke Utilities Co, Manteo, N. C., serving 875 customers on Roanoke Island for an undisclosed amount . . . Navopache Electric Cooperative, Inc, Lakeside, Ariz., has bought out Round Valley Light & Power Co, Springville, Ariz.

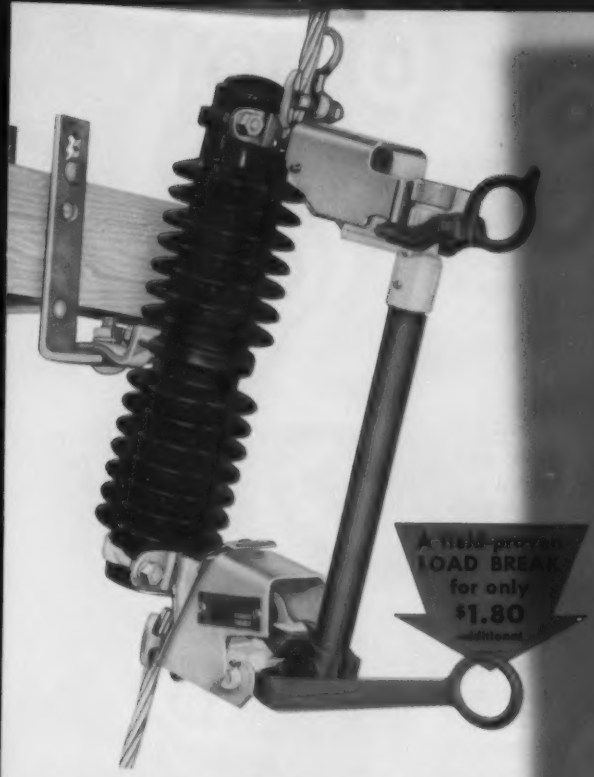
RATES

Cleveland, O., Department of Light & Power is planning a $800,000 a year rate increase . . . Kansas Power & Light Co receives Kansas Corporation Commission approval to put in a new space heating and water heating rates which will save consumers an estimated $47,000 a year . . . Because of declining net revenues and high construction costs, Bonneville Power Administration is considering a rate increase . . . Kentucky Utilities Co is eyeing a rate increase. In its 1956 annual report Pres R. M. Watt says: "It is the opinion of management that a good, sound case can be developed to fully justify and sustain an application for sufficient increases in rates to maintain a fair and reasonable return on the net plant account."

REGULATION

Kentucky Public Service Commission denies permission to Louisville Gas & Electric Co to discontinue direct current service. However, PSC says company may elect to discontinue dc service within three years if it pays to each customer affected half of the cost of the conversion. Company has 30 days to decide.

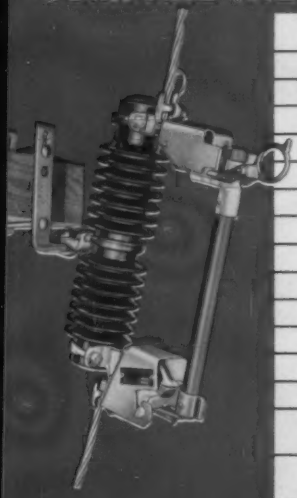
New rules of practice and procedure and general rules applicable to all utility operations in Mississippi has been issued by the PSC.



CHANCE *TYPE "F"* CUTOUTS

Here's what Utility Company Engineers say about Type F:
"It makes future system conversions simple and inexpensive . . . "I especially like being able to change from standard to load break . . . "It's ten times better than the cutouts we have been using . . ."You have given us all the things we have asked for in a cutout."
But find out for yourself—compare the Type F, feature by feature, with the cutout you are using today.

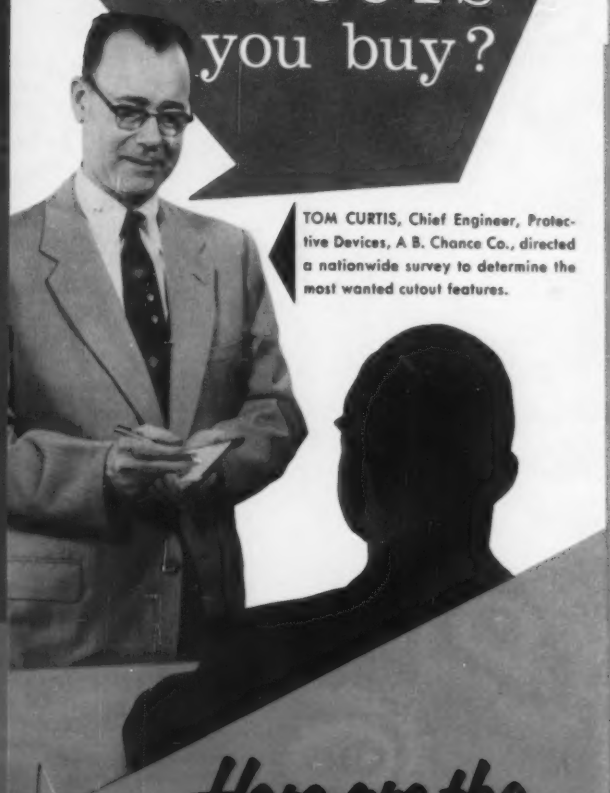
COMPARE THESE 16 FEATURES



Interchangeable Fuseholders Covering Complete NEMA Range
Wrap Around Insulator Bolts for strength
Bird Proof Construction
Lift and Tie Ring
Universal Terminals—#6 Solid cu. to 3/0 ACSR
Sleet Hoods at Both Ends
Positive Guiding of Tube
Positive Latch—holds tight against surges
All Contact Surfaces Silver Plated
Self Cleaning Contacts
Lever Action When Opening
Link Ejector—aids low fault interruption
Load Break
Fuseholder Cannot be Installed Backwards
180° Stop to Prevent Fuseholder Swinging Back into Pole
NEMA Standard Mounting Bracket

DEPENDABLE INTERRUPTION . .

What do you want in the CUTOUTS you buy?



TOM CURTIS, Chief Engineer, Protective Devices, A B. Chance Co., directed a nationwide survey to determine the most wanted cutout features.

Here are the features you asked for! *

* **A NATIONWIDE FIELD CHECK** of distribution engineers indicated sixteen important features that were wanted in fuse cutouts. *All sixteen* were combined into the Chance Type F Cutout—and *only* the Type F offers all these features!

Serving the Utility Industries since 1907

50TH ANNIVERSARY
A. B. CHANCE COMPANY

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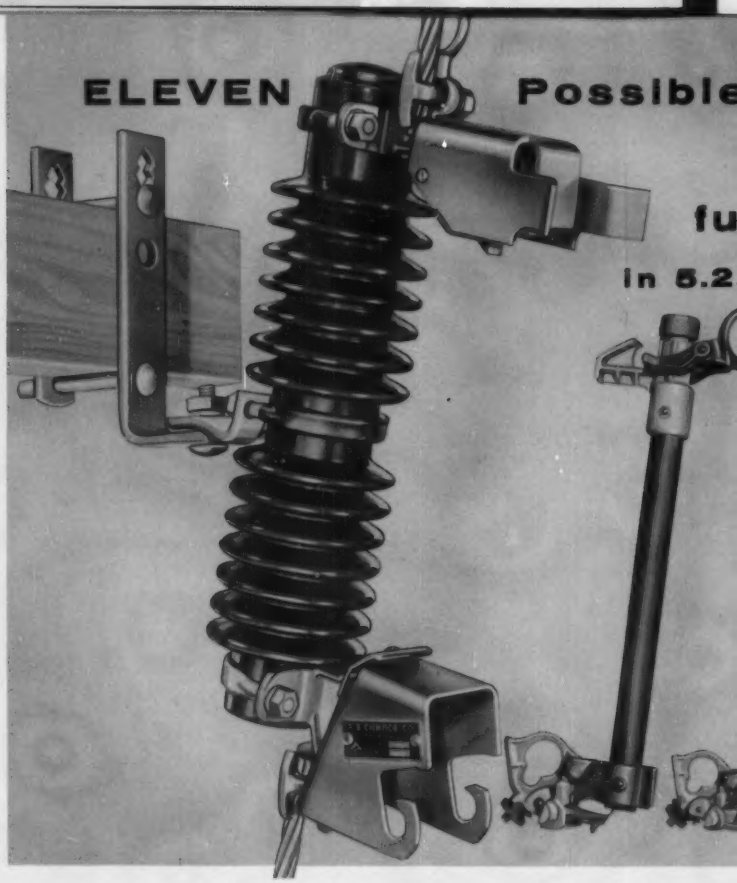

By simply changing the fuseholders, Chance 100 amp Type F Cutouts can be either regular or load-break, and can be altered to increase interrupting capacities from 3,000 to 10,000 amps in the 5.2 and 7.8 KV ratings and from 2,000 to 8,000 amps in the 15 KV rating.

For 200 amp service you can purchase 200 amp F Cutouts complete or convert the 100 amp fuse mounting to a 200. The change is simple —just remove the contacts with a screwdriver and wrench, replacing them with 200 amp contacts and using 200 amp fuseholders of the

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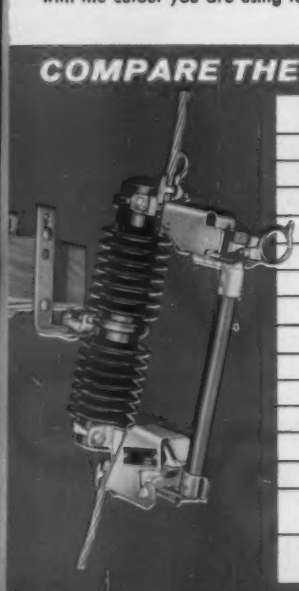
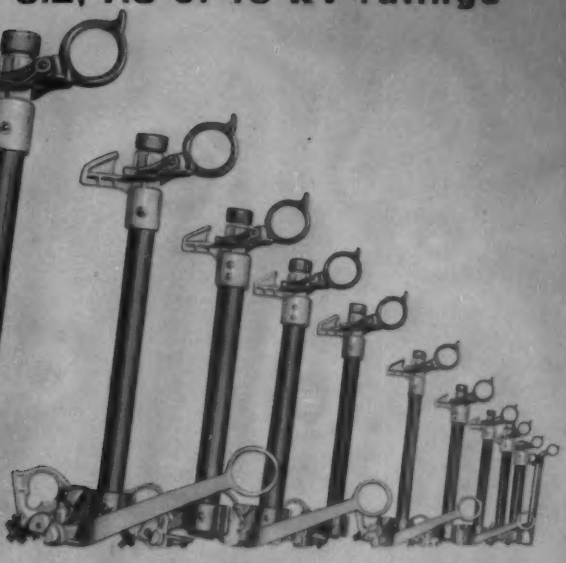


	Chance Type "F"	Cutout "G"	Cutout "K"	Cutout "L"	Cutout "J"	Cutout "H"	Cutout "N"	Cutout "M"
Interchangeable Fuseholders Covering Complete NEMA Range	YES	NO	YES	NO	NO	YES	NO	NO
Wrap Around Insulator Bolts for strength	YES	YES	NO	YES	YES	NO	NO	NO
Bird Proof Construction	YES	YES	YES	YES	NO	YES	NO	YES
Lift and Tie Ring	YES	NO	NO	NO	NO	NO	YES	YES
Universal Terminals—#6 Solid cu. to 3/0 ACSR	YES	YES	NO	YES	YES	YES	NO	NO
Sleet Hoods at Both Ends	YES	YES	NO	YES	NO	NO	NO	NO
Positive Guiding of Tube	YES	YES	YES	YES	NO	YES	YES	YES
Positive Latch—holds tight against surges	YES	NO	NO	NO	NO	NO	YES	NO
All Contact Surfaces Silver Plated	YES	YES	YES	YES	NO	NO	YES	YES
Self Cleaning Contacts	YES	YES	YES	YES	YES	NO	YES	YES
Lever Action When Opening	YES	NO	NO	NO	NO	NO	NO	NO
Link Ejector—aids low fault interruption	YES	NO	NO	NO	NO	NO	YES	YES
Load Break	YES	YES	YES	YES	YES	YES	YES	NO
Fuseholder Cannot be Installed Backwards	YES	YES	NO	YES	YES	YES	YES	YES
180° Stop to Prevent Fuseholder Swinging Back into Pole	YES	NO	NO	YES	YES	NO	NO	YES
NEMA Standard Mounting Bracket	YES	YES	YES	YES	YES	YES	YES	YES

DEPENDABLE INTERRUPTION...*on BOTH High and Low Faults*

ible Combinations with ONE fuse mounting,

5.2, 7.8 or 15 KV ratings



esired voltage and interrupting capacity (4,000 or 12,000 amp terrupting capacity in 5.2 and 7.8 KV... 4,000 or 10,000 amp terrupting capacity in 15 KV).

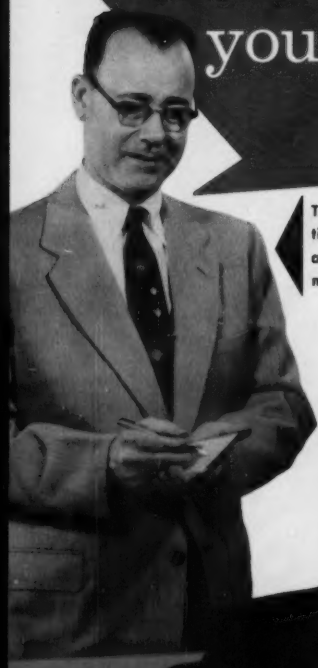
he same solid disconnect blade can be used in either the 100 or 200 mp mounting to convert to a 200 amp disconnect switch. Thus there re eleven possible combinations with one fuse mounting to meet all our future requirements. To get full details, write for the booklet "What do you want in the CUTOUTS you buy?"

CHANCE *Protectolink* OPEN LINK TYPE CUTOUTS

Protectolink Cutouts are efficent and inexpensive for wide application on rural distribution lines or where high interrupting capacity is not required. All manufacturers' open link fuses can be used in this cutout. Bird-proof construction with wrap-around mounting bolt. Available in two ratings, 7.5 and 15 KV, 50 amperes.

ECONOMY PLUS EFFICIENCY

What do you want in the CUTOUTS you buy?



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Serving the Utility Industries since 1907

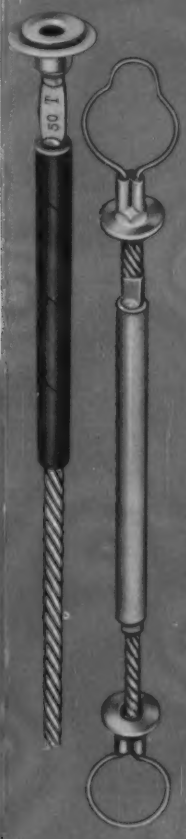
50th ANNIVERSARY

A. B. CHANCE COMPANY

CHANCE Fuse Links and Secondary Fuses

Engineered for system and equipment protection

for coordinated system protection



K & T FUSE LINKS

Precision manufactured to EEI-NEMA Interchangeability Standards

These fast (K) or slow (T) fuse links have the uniform quality needed for proper coordination.

Auxiliary tubes on links through 100 amps provide positive circuit interruption of low fault currents.

Low amperage links have a stainless steel ejection spring to further assure low fault current interruption.

for full overload capacity transformer protection without unnecessary outages

SloFast (Dual Element) FUSE LINKS

Follow the ASA safe loading curve for transformers

This exclusive Chance development permits full use of transformer overload capacity—virtually eliminates "burn-outs" due to overloads and secondary faults—isolates transformers in case of failure—improves continuity of service to your customers. Buttonhead and open link styles from 0.2 to 10.4 amps inclusive.

for complete secondary system fusing

Type CTSI Indicating Fuses

Here's secondary fusing that gives you protection from overload problems on your secondary systems . . . isolates failed capacitors or faulted sections—isolates transformers—localizes outages to help maintain customer service. Red plastic semaphore is released automatically when fuse element ruptures—can be easily spotted from the ground. From 5 to 200 amps inclusive. Available with insulated leads, as shown, or with bare leads.

All Chance Links and Fuses have exclusive lead-coated corrosion-resistant copper leads.

PACKAGED FOR EASY REMOVAL

Linemen can easily remove links from containers while wearing gloves. A slight firm twist separates the single container from the 5 unit container. The end of each unit container is perforated for quick removal of the link. Type and rating are clearly marked on both ends of each unit container.

Write for our new bulletin "FUSE LINKS AND HOW TO USE THEM." Address A. B. Chance Company, Centralia, Mo.

CK57-2

A·B·CHANCE CO·

ABC INDUSTRIES

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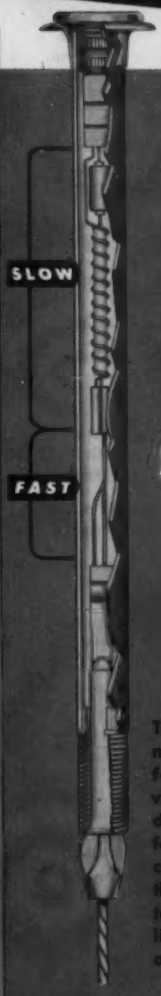

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A·B·CHANCE CO·

ABC INDUSTRIES

MEETINGS CALENDAR

MARCH

Electric Meter Institute—Eighth Annual Session, University of Denver, Denver, Colo., Mar. 25-29.

American Society of Mechanical Engineers—Engineering Management Conference, sponsored jointly with the American Institute of Electrical Engineers, Penn Sheraton Hotel, Pittsburgh, Pa., Pittsburgh, Mar. 27-28.

American Power Congress—19th Annual American Power Conference, Hotel Sherman, Chicago, Ill., Mar. 27-29.

Oklahoma Utilities Association—Annual Convention, Hotel Tulsa, Tulsa, Oklahoma, Mar. 28-29.

Illuminating Engineering Society—Pacific Northwest Regional Conference, Empress Hotel, Victoria, B. C., Canada, Mar. 28-30.

APRIL

Southeastern Electric Exchange — 24th Annual Conference, Boca-Raton Hotel and Club, Boca Raton, Fla., April 1-3.

Edison Electric Institute—Sales Conference, Edgewater Beach Hotel, Chicago, April 1-4; Accounting Division Advisory and Executive Committee, Madison Suite, Sheraton Park Hotel, Wash., D. C., April 8; National Accounting Conference of Electric & Gas Utility Accountants, held jointly with AGA, Washington, D. C., April 8-10; Industrial Relations Committee, jointly with Personnel Sections of Indiana Electric Assn. and Ohio Electric Utility Institute, and Personnel Practices Committee of Pennsylvania Electric Assn., Netherland Plaza Hotel, Cincinnati, Ohio, April 18-19; Meter and Service Committee, Soreno Hotel, St. Petersburg, Fla., April 24-26; Purchasing and Stores Committee Executive Committee and 10th Annual Meeting, Penn Sheraton Hotel, Pittsburgh, Pa., April 28-May 1; Insurance Committee, Williamsburg Inn, Williamsburg, Va., April 29-30; Accident Prevention Committee, Algiers Hotel, Miami Beach, Fla., April 29-May 1.

National Industrial Conference Board—8th Atomic Energy Courses for Managament, Rye, N. Y., April 1-6.

Indiana Electric Association—17th Annual Young Men's Utility Conference, Terre Haute House, Terre Haute, Ind., April 3-4.

American Institute of Electrical Engineers—Southern District Meeting, Heidelberg Hotel, Jackson, Miss., April 3-5; Great Lakes District Meeting, Hotel Fort Des Moines, Des Moines, Iowa, April 15-17; Third Biennial Conference on Electric Heating, sponsored jointly by AIEE and the Toledo section of AIEE, Commodore Perry Hotel, Toledo, Ohio, April 23-24.

Missouri Valley Electric Association—Engineering Conference, Hotel President & Municipal Auditorium, Kansas City, Mo., April 3-5.

Northwest Public Power Association — Annual Membership Meeting, Benjamin Franklin Hotel, Seattle, Wash., April 3-5; Engineering and Operations Section, Tacoma Utility Center and Winthrop Hotel, Tacoma, Wash., April 23-24.

American Society of Mechanical Engineers—Spring Meeting, Dinkler-Tutwiler Hotel, Birmingham, Ala., April 8-10.

Northeast Missouri Electric Power Cooperative—Eighth Annual REA Electric Generating Plant Operation and Maintenance Conference, Phillips Hotel, Kansas City, Mo., April 8-11.

National Electrical Industries Show—Fourth National Electrical Industries Show, 71st Regiment Armory, Park Ave. and 34th St., New York City, April 8-11.

Public Utilities Association of the Virginias—Rural Committee, Jackson's Mill, W. Va., April 9; Executive Committee, Richmond, Va., April 12.

Institute of Radio Engineers—First Annual Conference on Electronics in Industry, Illinois Institute of Technology, Chicago, Ill., April 9-10.

American Welding Society—Fifth Welding Show, Convention Hall, Philadelphia, Pa., April 9-11.

Electrical Engineers (ASEE) Exhibition, Ltd—Sixth Annual Electrical Engineers Exhibition, Earls Court, London, England, April 9-13.

Pennsylvania Electrical Association—Meter Committee, Garden City, Long Island, New York, April 11-12.

Maryland Utilities Association—Annual Spring Business Conference, Lord Baltimore Hotel, April 12.

Agricultural and Mechanical College of Texas—Tenth Annual Conference for Protective Relay Engineers, A&M College of Texas, College Station, Tex., April 15-17.

Rocky Mountain Electrical League—Spring Conference, Shirley-Savoy Hotel, Denver, Colo., April 21-24.

Lead Industries Association—Annual Meeting sponsored jointly with the American Zinc Institute, Drake Hotel, Chicago, Ill., April 24-25.

National Industrial Research Conference — Sponsored by Armour Research Foundation of Illinois Institute of Technology, Conrad Hilton Hotel, Chicago, Ill., April 24-25.

Association of Edison Illuminating Companies and Edison Electric Institute—Meter and Service Committee, Soreno Hotel, St. Petersburg, Fla., April 24-26.

Northwest Electric Light & Power Association—Engineering and Operating Section, Sun Valley, Idaho, April 24-26.

American Power Dispatchers Association, Inc—National Spring Meeting, Los Angeles, Calif., April 26-27.

Institute of Radio Engineers—Eleventh Annual Technical Conference on Television, Cincinnati Engineering Society Bldg., Cincinnati, Ohio, April 26-27.

MAY

Edison Electric Institute—Transmission and Distribution Committee, Muehlebach Hotel, Kansas City, Mo., May 2-3; Prime Movers Committee, Tides Hotel, St. Petersburg, Fla., May 6-8; Industrial Relations Committee, EEI Headquarters, New York City, May 16; Electrical System and Equipment Committee, Statler Hotel, Buffalo, N. Y., May 20-21; Accounting Division Time and Place Committee jointly with AGA, AGA Headquarters, New York City, May 22; Financing and Investor Relations Committee, Edgewater Beach Hotel, Chicago, Ill., May 31-June 1.

Southeastern Electric Exchange — Engineering & Operations Sections, Fontainebleau Hotel, Miami Beach, May 2-3.

Air Conditioning and Refrigeration Institute—Annual Meeting, The Homestead, Hot Springs, Va., May 5-8.

Pennsylvania Electric Association—Eighth Annual Customer Relations Conference, Hotel Hershey, Hershey, Pa., May 8; Electrical Equipment Committee, Hotel Roosevelt, Pittsburgh, Pa., May 9-10.

• **Public Utilities Advertising Association**—Annual Convention, Hotel Statler, Cleveland, Ohio, May 8-10.

Pacific Coast Electrical Association—Annual Convention, Fairmont Hotel, San Francisco, Calif., May 15-17.

• Additions this week.

Edison Electric Institute

Annual Convention will be held in the Palmer House, Chicago, Ill., on June 3-5.

Davis Is Elected to VP Post

American Gas & Electric Service Corp has announced the recent election of Lee L. Davis to the post of vice president in charge of area development.

The new vice president has devoted the major part of his 18-year career with the company to the area development field. In his most recent position he served as area development manager of the Service Corp. He is a graduate of New York University.

Davis now directs the area and industrial development programs for the seven-state American Gas & Electric System, which includes the following companies: Appalachian Electric Power Co, Flat Top Power Co, Indiana & Michigan Electric Co, Kanawha Valley Power Co, Kentucky Power Co, Kingsport Utilities, Inc, Ohio Power Co, and Wheeling Electric Co.

LEE L. DAVIS

West Penn Advances Cottom

Newly named manager of purchasing for West Penn Power Co is Walter Y. Cottom, former assistant manager of purchasing. He replaces Daniel E. Winslow, a 42-year company veteran, who retired recently after supervising the purchasing department since 1941.

Cottom, a Penn State graduate, has been with the utility since 1934. Since that time he has served successively as assistant personnel director, personnel manager, and manager of personnel services and employment. He was named to his most recent post in 1955.

Cottom is a member of Edison Electric Institute's purchasing and stores committee, vice chairman of the general section of Pennsylvania Electric Association, and a member of the Pittsburgh chapter of the National Purchasing Agents Association.

WALTER Y. COTTOM

Chase Names New President

Glenn P. Bakken has been elected president of Chase Brass & Copper Co, Inc, a subsidiary of Kennecott Copper Corp.

Bakken has served as executive vice president since he joined the Chase organization in January, 1955. Before his association with Chase he was with Reynolds Metals Co for almost ten years. While there, he served in various executive posts and rose to manager of the company's Phoenix, Ariz., plant.

A 1942 graduate of the University of Minnesota with a BS degree in mechanical engineering, Bakken was affiliated with the Aluminum Co of America for four years before going to Reynolds in 1946.

GLENN P. BAKKEN

ADVERTISEMENT

Overhead Cables for Distribution

CURRENT TRENDS

No. 6 in a series of articles

Up until the last decade practically all overhead distribution involved some form of open-wire construction. Probably the most advantageous factor justifying this procedure has been economy plus an acceptable experience record. Like everything else, times are changing so that it is no longer axiomatic that open-wire circuits must continue to be used for overhead power distribution. Therefore, a brief story behind some of the modern cable designs for these applications may be of interest.

The need for cable is unquestioned. Overcrowded poles, severe tree conditions, storms, public relations, regulation problems and appearance are some of the contributing reasons for this need. The cable industry in recognition of this need has developed suitable cable products for almost every overhead distribution job and the Rome Cable Corporation has played a most active role in this progressive development. Cable costs have been so reduced by careful design and use of new materials that installed economies now closely approach open-wire construction in many instances. Today's distribution engineer would be remiss if he did not at least consider an appropriate type of cable for his new or replacement overhead distribution circuits. Rome Cable is prepared to supply all of these products and associated engineering services.

Primaries

There is a definite trend towards aerial cable in the 5 kv to 15 kv range but it is difficult to conclude whether this trend is more in factory-assembled or the field-assembled variety, since there are merits for each.

In the 5 kv range the cost of cable compared to open-wire construction may not be too attractive when evaluated on the installed cost per mile of line, averaging approximately twice as much. In the 15 kv range this picture improves somewhat. However, if this comparison is based upon final installed cost per KVA this differential between cable and open wire is considerably narrowed. Naturally, there must be other determining reasons for using cable, such as improved appearance, resistance to storms, less tree trimming, better voltage regulation and greater reliability.

Preference for cable design in the 5 kv rating utilizes ozone-resistant rubber insulation (such as Rome Cable RoZone) with a suitable nonmetallic sheath (such as Rome Cable RoPrene or RoSeal) ... unshielded and relatively easy to hot tap, particularly when the cable incorporates the "reverse-lay" feature. Economic preference for cable designs for the higher primary voltages, utilizes the same grade of insulation on each conductor covered with a bronze tape which serves as a combined shield and armor but makes "hot tapping" difficult and hazardous. These and other cables may be supplied with insulated copper or aluminum power conductors all properly bound to the correct Copperweld messenger as described in the new IPCEA-NEMA specifications for aerial cable or an equivalent type. Installation procedures for factory-assembled or field-spun cables are described in the technical literature as well as manufacturers' catalogs.

Secondaries

Until quite recently there has been relatively little activity or interest in using cable for overhead secondaries but several utilities have been investigating and experimenting with either field- or factory-assembled cables for this application. Joint pole construction, elimination of crossarms, reduction of hardware, ease of installation, improved appearance, storm resistance, improved regulation and less tree trimming are some of the features to be realized, provided final installed cost is not prohibitive.

It is here that aluminum, at least for the phase conductors, seems to offer definite economic and technical advantages since the lighter weight is a most useful feature for line construction. With the advent of the now popular Triplex construction for service drops the idea of a similar factory-assembled cable for secondaries has certain merits. For single-phase secondaries, this cable generally consists of two insulated aluminum conductors (usually #1/0 or #2/0 AWG aluminum) spiralled around a suitable neutral messenger.

When this cable is used on conventional 150-foot pole spacings the service taps can be made at or near each pole with special fixtures now available. However, it is obvious that greater savings are possible with increased pole spacings and "flying" midspan service taps made where possible or convenient. Prefabricated devices to accomplish these taps have been developed. Thus, the combination of Triplex secondaries and services offer a new and advantageous construction idea at modest cost.

When secondary sizes larger than #2/0 AWG are required, either spinning or a cable construction similar to primary aerial cable is suggested.

Services

The use of open-wire service drops is rapidly disappearing particularly in new construction and housing developments. Service drop cable, Type SD, utilizing concentric neutral has been too costly to merit universal acceptance unless some special feature such as reduced theft possibility was desired. Nine years ago the Rome Cable Corporation introduced the now popular neutral or self-supported Triplex type of service drop cable. This design received almost instant acceptance and has proven highly satisfactory. The power conductors, insulated with polyethylene or Neoprene, are spiralled around a neutral messenger in accordance with IPCEA recommendations.

Aluminum unquestionably offers economic and technical advantages for the power conductors and has become the general choice of metal for this particular application. A popular neutral messenger has been a reduced size ACSR but the idea of hard-drawn copper has been gaining favor, particularly where there is planning towards Triplex secondaries with Copperweld messengers in order to provide copper-to-copper contacts on the exposed neutrals. Consideration of this "combination" design is suggested.

For further information on Triplex services or secondaries we suggest you obtain Rome Cable Bulletins RS-5 and MST-1.

Tree Wire

This discussion would not be complete without some reference to so-called Tree Wire installed on insulators for overhead construction. For primaries and unusually important secondary circuits this product would cost considerably less than insulated cable and somewhat more than weatherproof wire. Where extensive tree trimming is a problem or too costly the use of the newer low-cost special thermoplastic Tree Wire designs might be considered. Here, again, Rome Cable is ready with the information and the product.

ROME CABLE CORPORATION, Rome, New York

S & W Promotes Maloney

Charles W. Maloney has been appointed chief electrical engineer of Stone & Webster Engineering Corp.

Maloney, who was graduated from Massachusetts Institute of Technology in 1921 with an electrical engineering degree, joined Stone & Webster about 30 years ago. After two years in design work he was assigned to engineering department duties involving projects for clients in numerous locations and including utilities, industries, and organizations of diversified interest.

Leslie O. Waite, his predecessor as chief electrical engineer, has become a consulting engineer for the organization.

CHARLES W. MALONEY

PERSONAL BRIEFS

New England Electric System has advanced **Earl P. Mosely** to civil engineer of New England Power Service Co. **Guy W. Nichols, Jr,** is new executive assistant in the NEES Boston office.

In recent executive appointments, Ohio Edison named **George E. McKenna** as head of the new claims department; **William M. LaSalle,** general coordinator of personnel relations; **Howard B. Gould,** manager of the Alliance Division; and **Robert G. Zimmerman,** superintendent of electric and steam heating sales, Youngstown Division.

Parker J. Davies will become Pennsylvania Power & Light Co's superintendent of system operation at Hazleton on April 1. He replaces **Elliott W. Middleton** who retires on that date.

Pacific Power & Light Co's Coos Bay area has as its new district manager **A. J. Moore.**

Leonard D. Eesley has been named assistant general counsel by Federal Power Commission. He assumes the post left vacant by the promotion of **John C. Mason** to deputy general counsel of the commission.

New transportation supervisor at Consumers Power Co is **Clifford G. Gallup** . . . Montana Power Co has named **William T. Campbell** as Helena Division chief accountant.

Virginia Electric & Power Co's recently appointed rural representatives are **Willis Aubrey Council,** who will serve the South Boston area; and **Aubrey M. Whorley,** Williamston area.

Connecticut Light & Power Co's industrial sales department has appointed the following to industrial sales engineer posts: **Kenneth L. Henry,** Waterbury district; **Ralph O. Smith,** Meriden district; and **Frederick W. Riggs, Jr,** Essex.

Arkansas Power & Light Co has advanced **Gordon B. Fountain, Jr,** to community development counselor in Southeast Arkansas.

Recently nominated to fill American Institute of Electrical Engineers offices were **L. F.Hickernell of** Anaconda Wire & Cable Co. for the treasurer's post; and for posts as directors, **Edwin W. Morris** of Westinghouse Electric Corp and **Dr William R. Clark** of Leeds & Northrup.

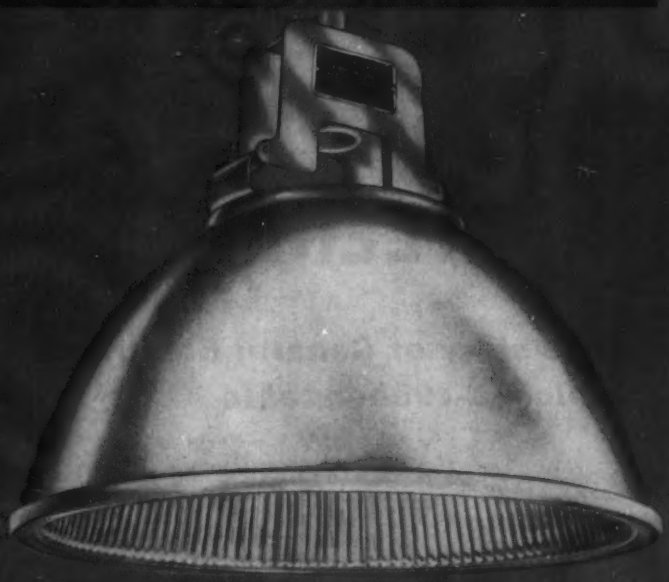
(More Personal Briefs on page 152)

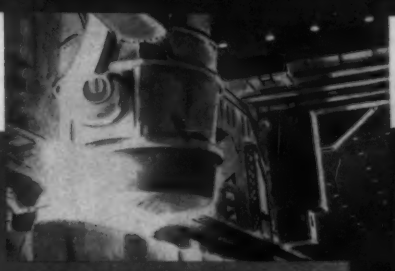
EERA Names Knaus 1957 President

Malcolm F. Knaus (third from left) was elected 1957 president of the Electrical Equipment Representatives Association at the group's recent annual meeting. Other new officers are (L to R): C. B. Anderson, second vice president; Oliver B. Lyman, secretary; Knaus; F. E. L. Whitesell, executive director; Marvin R. Horne, executive vice president; and Conrad R. Bangh, treasurer. Edward W. Verbarg, retiring president, and Curtis H. Stout were elected to the board of directors.

NEW! For Effective Lighting of High Mounting Areas...

HOLOPHANE HIBAY* Reflector For Mercury Vapor Lamps





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No. 640

Holophane engineers, authorities in the development of lighting for industrial interiors, present another important contribution in this field —a new HIBAY Reflector... Designed for 400 Watt Mercury-vapor lamps... This unit consists of only two parts: (1) ventilated socket yoke; (2) smooth prismatic reflector with sealed metal cover. This simplified construction permits easy installation and economical maintenance. Reflector surface is kept clean by upward draft action induced by open design. Exposed socket assembly assures rated lamp life. Light source is deep-shielded, eliminating glare.

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The name HOLOPHANE is your Surest Guide to LIGHTING QUALITY

Every Holophane product is carefully and individually pressed on specialized equipment. Only by this painstaking process can we make prismatic forms accurate enough to direct light precisely where it is needed. Holophane products provide the basis for custom-engineered lighting systems, specifically designed for each area. To be sure of quality look for the name "HOLOPHANE" impressed on each piece.

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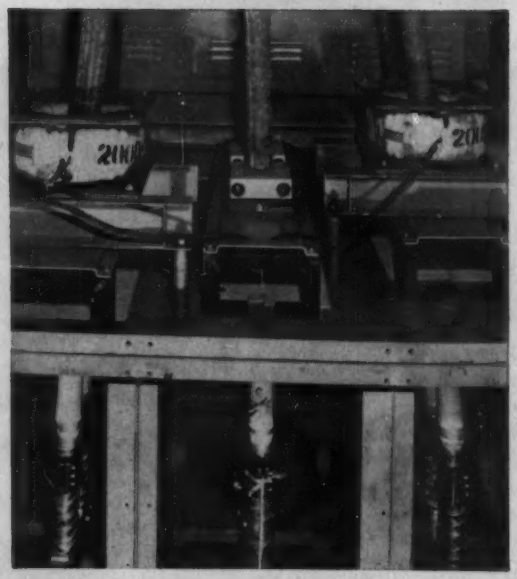
Holophane *For Better Lighting...Be Specific*



GENERATOR LEADS were one of the first applications considered in developing silicone-rubber cables. These G-E silicone-rubber generator leads are in use at the Washington Water Power Company's Cabinet Gorge generating plant.

Breaking the TEMPERATURE BOTTLENECK

The story of General Electric silicone-rubber cable

Several years ago, electrical engineers in generating stations and in industry were faced with what was virtually a bottleneck in the use of high-temperature equipment. They had already obtained greater equipment capacity and reliability through the development and rapid adoption of Class H insulation for generators, transformers, motors, and switchgear. (For example, windings on Class H insulated motors could withstand an operating temperature of 180 C. Switchgear was available for operation at 85 C to 100 C).

But, in many cases, this capacity could not be fully utilized, and the reliability was partially negated, by the cables then available. These cables, which had a maximum permissible copper temperature of 70 to 85 C, could neither carry the load nor withstand the temperatures of the equipment to which they were connected.

A number of electric utilities developed temporary solutions, such as locating copper connections on transformers and switchgear in remote spots away from the heat. On motors, cable connections were stripped of their regular insulation and rewound with hand-applied Class H insulation.

Developing new insulations

To find an answer to the problem of high temperatures G-E engineers continued their search for new insulations. Although asbestos and glass had excellent high-temperature qualities, their low dielectric strength was a drawback — especially in applications above 600 volts.

As part of their continuing search, General Electric engineers tested a form of silicone—silicone rubber. Investigation showed that silicone rubber glass tapes possessed excellent qualities. Furthermore, these tapes could be applied to cable by the same economical methods as conventional tapes of varnished cambric.

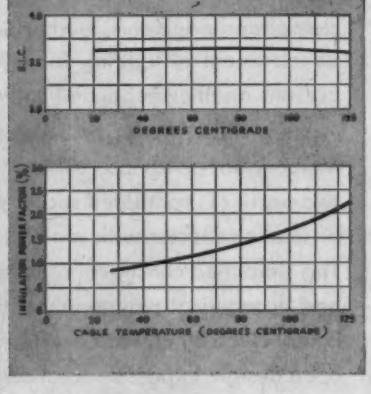
The result? A new cable insulated with silicone-rubber-coated glass cloth was developed. Because of its outstanding mechanical and dielectric advantages one of the first applications was its use as high-temperature generator leads. (See Fig. 1.)

New silicone-rubber cables with extruded insulation were also developed for other applications — for power and control circuits. These cables are rated at 125 C conductor temperature for service up to 15 kv for tape types and 5 kv for extruded types.

Thus, General Electric achieved another first with these cables that are proving especially valuable to plants where thermal bottlenecks prevent full use of equipment or where space is limited.

Fig. 1: DIELECTRIC PROPERTIES OF SILICONE-RUBBER GENERATOR CABLE

Typical test results obtained on a single-conductor, 2500 MCM, 15 kv cable, insulated with 0.25 inches of silicone-rubber-coated glass tapes.



IN 75 YEARS, power cable technology has progressed from the Edison Tube of 1881, shown being installed in New York City, to today's G-E silicone-rubber cables.

Economic considerations

Silicone-rubber cables offer many economic advantages due to their greater current-carrying capacity (see Fig. 2 below). First, they can be installed in existing ducts and conduits, thereby reducing first costs. Second, the high-current leads require less space on new jobs — and future expansion need not involve extensive renovation. Furthermore, silicone-rubber cables increase the reliability of your entire electrical system because the weak link of low-temperature cables has been removed. The recurrent expense of replacing burned-out cable is minimized—an important factor where hot spots (around furnaces, steam pipes, and other sources of high ambients) are problems.

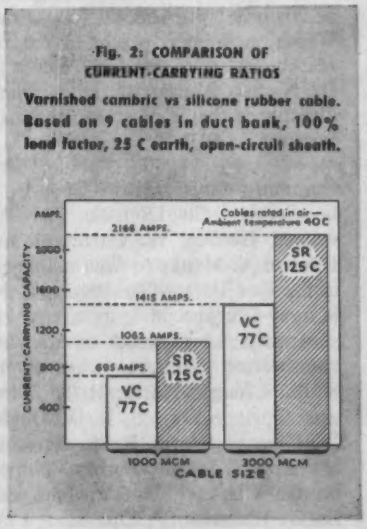


Fig. 2: COMPARISON OF CURRENT-CARRYING RATIOS

Varnished cambric vs silicone rubber cable. Based on 9 cables in duct bank, 100% load factor, 25 C earth, open-circuit sheath.

Free booklet offered

General Electric has prepared a new booklet containing complete information on the new silicone-rubber cables. You can obtain your copy by writing for *Silicone-rubber Wire and Cable* to Section W178-327, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

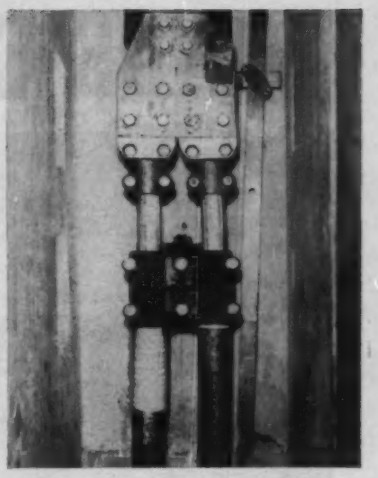
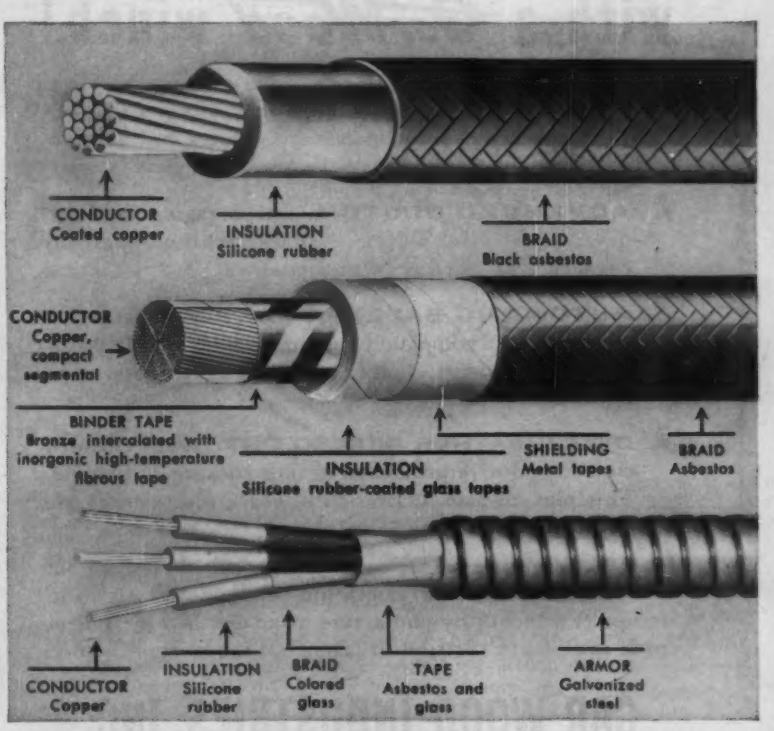


PHOTO SHOWS termination of 2500 MCM, 15 kv silicone-rubber-insulated cable in Con Edison's Hell Gate generating station. Stress cone is completed on cable at left —in process on cable at right.

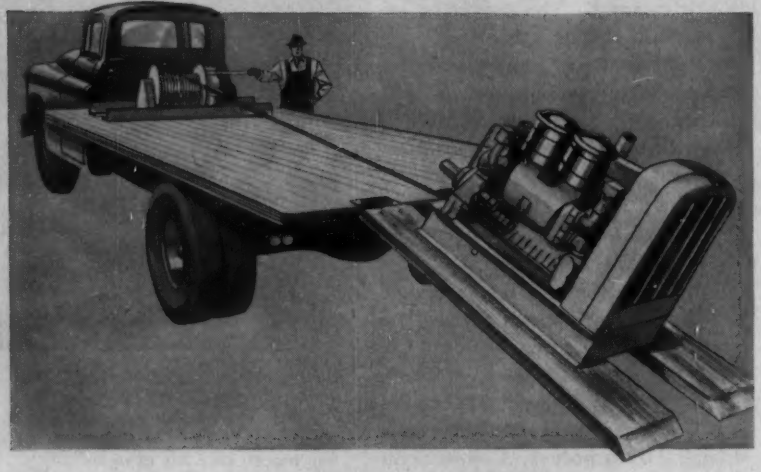


TYPICAL CONSTRUCTION OF SILICONE-RUBBER CABLES. (Top)—Power cable withstands high temperatures in wet and dry locations, exposed or in conduit. (Center)—Generator cable used for high-current generator leads. (Bottom)—Control cable, used for control or signal circuits in wet and dry locations, withstands flame and constant high temperatures.

Progress Is Our Most Important Product

GENERAL ELECTRIC

LOADS CAN'T SLIP



with a GarWood winch!

Loads *can't* slip, but that's only one of the reasons why you're *way* ahead with Gar Wood winches! They also give you perfect dependability . . . safer operation . . . longer unit life . . . as well as the rating you need to do the job. Check these features:

1. **ADVANCED CLUTCH** is self-engaging. Loads can never slip or break away . . . even if clutch is only partially engaged. The result is far greater *safety!*

2. **AUTOMATIC SAFETY BRAKE . . .** Brake is self-energizing and completely automatic. Stops and holds any load up to capacity . . . yet full release when hoisting virtually *eliminates* drag wear!

3. **DIRT, WEATHER SEALED OUT . . .** Fully enclosed clutch is positive protection against sticking or freezing. This, plus oil-bath lubrication of gears, adds *years* to life of the unit!

PLUS a size and type for every application, in ratings from 7,000 to 100,000 pounds. Check this famous line of truck and stationary winches by contacting your Gar Wood-St. Paul truck equipment distributor. Or, mail the coupon below.

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Personal Briefs

(Continued from page 148)

R. E. Ruble is new West Texas Utilities Co district manager in Ballinger. In other company promotions, **S. B. Phillips** was made administrative and executive assistant at the Abilene general office; **Herman C. Ledbetter** succeeds him as district manager in Marfa; **Goodson Sellers** becomes local manager in Munday to succeed the late **A. H. Mitchell;** and **R. B. Carothers** transfers to Rule as local manager.

Atomic Energy Commission has appointed **Richard L. Kirk** as assistant director for international organizations of the Division of International Affairs. In his new post he will aid in formulation of policies covering U. S. participation in the International Atomic Energy Agency when it is established.

New president of Ontario Association of Municipal Electrical Utilities is **G. R. Davis,** general manager of Kingston Public Utilities Commission. **J. A. Williamson,** manager of Niagara Falls Hydro Electric Commission, was elected vice president.

Polytechnic Institute of Brooklyn has appointed **Dr John G. Truxal** to head the electrical engineering department. He succeeds **Dr Ernst Weber,** now vice president for research. Also succeeding Weber is **Dr Nathan Marcuvitz,** who is new director of the Microwave Research Institute at PIB.

Commonwealth Edison Co's Public Service Co Division has advanced **Herbert W. Carnright** and **Edward A. Menke** to area managers in the Fox Valley-Glenbard and the Harvey-Chicago Heights areas, respectively. Appointed as division commercial managers were **P. E. Smith,** Chicago-North; **R. L. Johnson,** Chicago-Central; **E. J. Doyle, Jr,** Chicago-South; **R. E. Freston,** Maywood; **John Eilering,** Northbrook; **Clarence Hall,** Joliet; and **D. G. Womeldorff,** Dixon.

V. J. Cissna, electrical engineer with Tennessee Valley Authority, has been named a fellow of American Institute of Electrical Engineers.

(More Personal Briefs on page 154)

NUCLEAR NEWS FROM ATOMICS INTERNATIONAL

OMR a promising approach to meet world's need for small to large power plants

An important goal of the Atomic Energy Commission's program to develop electric power from the atom is a low-cost reactor for plants with gross outputs of 10 megawatts or more. Such plants are particularly suited to areas that need relatively small increments of additional power, and to those parts of the world where coal, oil, and water-power are scarce or costly.

The OMRE (Organic Moderated Reactor Experiment), which ATOMICS INTERNATIONAL is now building at the National Reactor Testing Station in Idaho, is one of the more promising types for this purpose. The new experimental reactor was pioneered by ATOMICS INTERNATIONAL – from preliminary design to prototype.

It will be used to investigate the rate of degradation of organic fluids, the properties and compositions of the equilibrium mixture in the reactor, and the effect of organic fluids on heat-transfer surfaces. Results of these experiments will be incorporated into the nuclear power plants ATOMICS INTERNATIONAL is planning for Piqua, Ohio and a Latin American country.

Basic advantages of the OMR are small size, compact core with good neutron economy, and elimination of problems with high-pressure primary coolant circuits and uranium-coolant reaction hazards. Its safety features are outstanding. The high boiling point of the organic moderator-coolant fluid permits a low-pressure system. There are no chemical incompatibilities between coolant and uranium or coolant and water, and no unusual corrosion problems. Because of its fluid moderator—an isomeric terphenyl—the OMR has a negative temperature coefficient of reactivity, which acts as a governor in case of power surges or excess power levels. The organic fluid becomes only slightly radioactive, which makes the entire heat-transfer system relatively accessible.

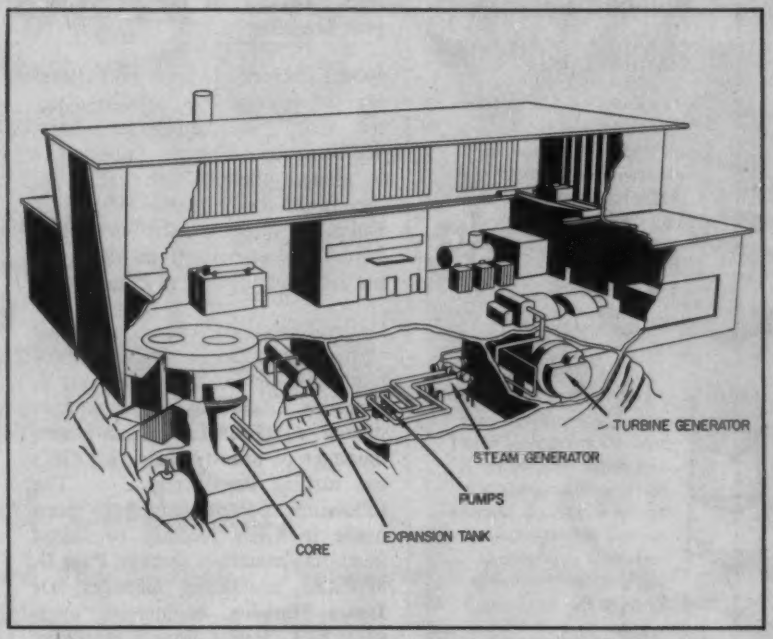
A typical power plant, such as the one proposed for Piqua, Ohio, has a gross electric output of 12,500 kilowatts and a heat output of 45,500 thermal kilowatts. It produces steam at a pressure of 415 psig (29 kg/cm²) and a temperature of 550°F (288°C).

The reactor core is heterogeneous, with fuel elements and control rods immersed in the moderator-coolant fluid and contained in a thin-walled core tank. The fuel is uranium slightly enriched in U^{235}.

Power costs for this reactor, including both capital and operating charges, are estimated at 18 mills per kilowatt-hour. Power costs will be significantly lower in larger OMR plants. Lower power costs are also expected to result from advances in OMR technology.

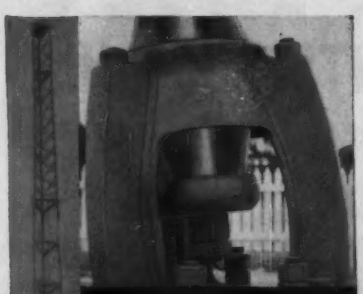
Atomic power for supertankers. The AEC has assigned ATOMICS INTERNATIONAL the challenging design study to adapt the OMR for maritime use. The OMR, considered a promising possibility for ship propulsion, is expected to be particularly suitable for supertankers. The OMR offers the safety of a low-pressure system, low construction costs (because it can be built of aluminum and mild steel instead of more expensive zirconium and stainless steel), and low maintenance costs.

ATOMICS INTERNATIONAL is staffed and equipped to help you with any phase of reactor development. Please write: Director of Technical Sales, Dept. EW-72, ATOMICS INTERNATIONAL, P. O. Box 309, Canoga Park, California. Cable address: ATOMICS.



Typical OMR Central Station Nuclear Power Plant

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM



Compression insulators used at foot of antenna towers

PREVENT ARCING and FLASHOVER DAMAGE with DOW CORNING 5 SILICONE COMPOUND

Dow Corning 5, a grease-like silicone dielectric, maintains a high surface resistivity on porcelain insulators despite contamination by smoke, cement dust, fly ash, chemicals, and other materials.

By preventing the formation of conducting moisture films, this silicone compound gives safe, long-lasting protection against arcs and flashovers. What's more, contamination is easily wiped off silicone coated insulators—reducing your cleaning and maintenance costs to the minimum.

Also an all-weather lubricant for switches, meters and condensers, Dow Corning 5 won't stiffen, freeze, bleed or crack at temperatures from —70 to 400 F.

FREE SAMPLE
and full information on request

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DOW CORNING CORPORATION
Midland, Michigan

Personal Briefs

(Continued from page 152)

George A. Suckfield, Jr, is newly named purchasing agent of Pittsburgh Standard Conduit Co . . . G&W Electric Specialty Co has announced the resignation of **C. W. Sward** as vice president and director of sales promotion.

Robert F. Schall has been appointed to the post of sales manager of Kelman Electric & Manufacturing Co, I-T-E Circuit Breaker Co's recently acquired subsidiary. Schall most recently served as equipment sales manager of I-T-E's Switchgear Division.

John F. Myers has been named general manager of Westinghouse Electric Corp's marketing subsidiary, Westinghouse Electric Supply Co, to assume the post left vacant by the recent resignation of **Victor D. Kniss,** president of the subsidiary. Myers will also continue as a vice president of the parent company.

General Electric Co's medium steam turbine, generator, and gear department has appointed **Capt Robert T. Simpson,** USNR, as senior product planner . . . **John L. Mangan** is new manager of industry sales for GE's gas turbine department . . . The following appointments have been made in GE's recently organized insulating materials section; **Paul D. Williams,** marketing manager; **Dr James Marsden,** engineering manager; **A. L. Jewett,** finance manager; **Rial O. Herreman,** employee relations manager; **G. M. Yesse, Jr,** facilities planning project manager; **J. C. Morris,** mica products and coated materials plant manager; **J. A. Loritsch,** insulating paints and varnishes plant manager; and **A. J. Grossman,** operations research and synthesis specialist.

Richard A. Geuder has been designated as general manager-marketing and **Carl V. Gregory** as sales manager of Reliance Electric & Engineering Co.

Dynaseal Light Corp has elected **John J. Caldwell** as vice president and general sales manager . . . **Charles P. Michalski** has joined C & D Batteries, Inc, as project engineer.

INDIANA STEEL & WIRE CO. MUNCIE, IND. — Crapo Galvanizing

Signs along the lines of *Crapo* **GALVANIZED STEEL STRAND PERFORMANCE**

For dependable performance . . . Insist upon *Crapo* Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes *Crapo* Steel Strand first choice for guys, messenger and overhead ground wire.

The famous *Crapo* galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.

- Low maintenance cost
- Laboratory tested and controlled quality
- Meets highest quality standards
- A size and grade for all practical needs
- Contact your *Crapo* Jobber Today!

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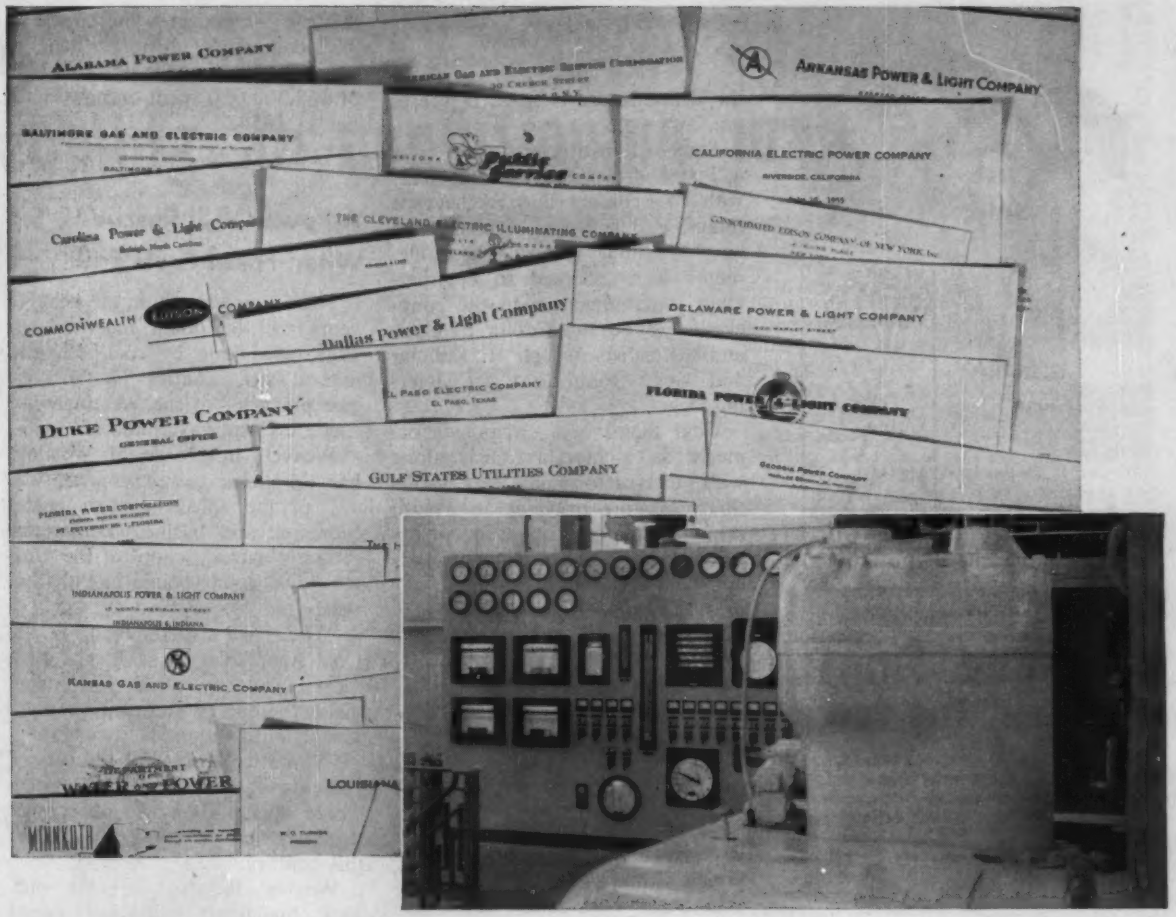
When the next rung on the ladder seems a long way off—that's when Electrical World can really lend a hand. Keeps you advised of the latest technical developments, in touch with fast-breaking industry news, alert to possible future developments, keeps you abreast of industry statistics, legislation, industrial relations—Only "The Electrical Industry's Weekly Magazine" can keep you really *on top of every industry occurrence of importance!*

You read Electrical World regularly, you'll see what we mean . . . and so will your boss! Electrical World, 330 West 42nd St., New York 36, N. Y.


ALABAMA POWER COMPANY
ARKANSAS POWER & LIGHT COMPANY
BALTIMORE GAS AND ELECTRIC COMPANY
CALIFORNIA ELECTRIC POWER COMPANY
COMMONWEALTH EDISON COMPANY
Dallas Power & Light Company
DELAWARE POWER & LIGHT COMPANY
DUKE POWER COMPANY
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You're in good company

when you choose . . . Honeywell instrumentation

You join America's best-known electric power generating companies in your choice of instrumentation by Honeywell. You'll find Honeywell instrumentation everywhere . . . in large stations and small. The reasons for this are clear.

With the precision, stamina, and reliability of Honeywell instruments, you get an important extra . . . service. This service begins with your first plans, and continues long after your instruments are installed. It includes:

Application engineering of instrumentation, custom-fitted to your plant by a staff experienced in power station measurement and control.

Installation and startup assistance by Honeywell service engineers.

Maintenance engineering, in emergencies or on a periodic service schedule, by factory-trained specialists located near you . . . in the more than 112 Honeywell offices in the United States and Canada.

Quick shipment of spare parts, from your local Honeywell branch office or from the Parts Depot in Philadelphia.

Training of your instrument men in up-to-date maintenance methods at the tuition-free Honeywell Education and Training Center in Philadelphia.

These are but some of the benefits you gain when you add your company's name to the list of prominent companies using Honeywell instrumentation. Get the full story from your nearby Honeywell sales engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

clear lines fast with...

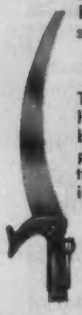
SEYMOUR SMITH
"Telephone" Tree Pruner

Here's the standard, the choice of the utility industry for years. Powerful action to cut cleanly—tough and almost unbreakable—easy to handle. No. 12 Pruner Head has 1½" cutting capacity. The lighter, No. 11, handles up to 1" branches. Both are malleable iron castings with tempered steel cutting blade.

Poles (18 ft. 3 sections) are of selected spruce with positive locking, seamless aluminum, telescoping ferrule joints.

FAST CUTTING PRUNING SAWS

Designed for fast, easy cutting—large, deep teeth, finest Swedish charcoal steel, streamlined, laminated hardwood handles. Every model you need up to chain saw work.



No. 20 POLE SAW HEAD

Tough aluminum head with large hook and outside horn for pushing branches, raising wires, etc. Also paint brush holder with wire clamp that holds brush securely. Fast-cutting 16" blade. Poles available.

FREE: Send for Seymour Smith catalog pages on tools for utilities. Keep them on file for easy reference.

Quality Tools
SEYMOUR SMITH
Since 1850

SEYMOUR SMITH & SON, Inc.
2403 Main St., Oakville, Conn.

Computer Tapes Coal

(Continued from page 95)

the denominator is some power of ten.

Standard instruments used were a 3-wire, 4-element totalizing relay with a 4:1 contact ratio; ratchet type relays; and a 3-wire, 3-phase, 2.5 amp watthour meter. These elements were adapted to coal-per-kwhr measurement with the cooperation of Foreman John F. Cook and Specialists Joseph R. Kellmer and Albert Robinson of the Metering Dept.

Coal factor was computed formerly on a monthly basis along with other performance data. While this procedure provides an overall average picture of operation, it becomes largely historical. It does not yield specific checks upon various loads and times soon enough to guide operating improvements.

Manitoba Adding Hydro on Nelson River

Manitoba Hydro-Electric Board is harnessing the Nelson River at Grand Rapid, 425 miles north of Winnipeg. This plant which will be known as the Nelson River Power Project No. 1 will cost about $40,000,000 and will provide power for a $175,000,000 nickel development by International Nickel Company of Canada Ltd. in the vicinity of Mystery and Moak Lakes, 50 miles to the southwest.

It will be the largest station in the province, with an initial capacity in 1961 of 200,000 horsepower and an ultimate capacity of 400,000 horsepower—enough to feed the needs of a city the size of Winnipeg.

Big Budget for Vepco

Virginia Electric & Power Co has approved a record-breaking construction budget for 1957 totalling $70,000,000. The company's directors also authorized the installation of 150,000-kw steam generating addition to the Chesterfield Power Station near Richmond.

Edwin H. Will, president, said that the '57 budget is the largest in the company's history and is about 12% above the previous high of $62,300,000 spent on new facilities in 1954.

A-Power Will Rescue U. S. When Fossil Fuels Fail

Atomic power within the next 43 years will be doing most of the work now done by coal, oil, and natural gas, Charles H. Weaver, vice president of the Westinghouse Electric Corp, has predicted.

Weaver, in charge of Westinghouse's atomic power program, was one of the speakers at a recent economic and business conference of the Wharton School of the University of Pennsylvania in Philadelphia.

"Today we are still living in the Coal Age," Weaver said, "for coal, more than any other single fuel yields the energy that now supports and sustains industrial society.

"While large physical reserves of coal are still on hand, coal alone would appear to satisfy our power demands only for the remainder of this century."

Weaver declared that the outlook for fossil fuels is "indeed dark." Before the end of the century, the supply of coal, petroleum, and natural gas will be depleted to the point that they will no longer meet U. S. energy needs, he said.

Loan Going for Lines

Loup River Public Power District, Columbus, Neb., proposes to use its recent $9 million REA loan to make additions to its present transmission system. These include 258 miles of 115 kv transmission line, 50 miles of 161 kv line, and extensive system improvements including additional substations and switching equipment.

Expansion Planned

Central Illinois Public Service Co will spend $22,000,000 in 1957 to expand its electric and gas facilities in central and southern Illinois, reports M. S. Luthringer, president.

Here's an easy way to help PREVENT coming air-conditioning load problems

It won't be long . . . hot weather is coming . . . and so are the load problems resulting from the growing number of air conditioners being added to your lines.

But, with the General Electric CF-7 hook-on recorder these load problems can be anticipated . . . can be prepared for before the problems actually occur.

THE CF-7 PORTABLE, hook-on recorder offers you a convenient, economical means of obtaining the accurate records you need for intelligent load planning . . . and for the most efficient use of substation equipment. It provides these valuable records with an accuracy of 3% full scale . . . with a wide choice of ranges . . . and for all varying loads up to 750 amperes.

Check these important features:

1. HIGH ACCURACY—3% accuracy of full scale gives you records you can rely on for future planning.

2. FAST, EASY INSTALLATION—simply hang recorder, connect to 120v or 240v power supply, select current range, attach leads, and hook on the line.

3. NO SERVICE INTERRUPTION—no cutting or splicing required when measuring current . . . CF-7 will operate continuously for 30 days without attendance.

4. 8.7 KV TRANSFORMER INSULATION RATING—made possible by stronger Butyl molded insulation . . . enables safe, accurate testing of even high-voltage circuits.

5. MULTI-RANGE OPERATION—close readings can be made over ranges of 15/30/75/150/-300/750 amps and 150/300/750 volts a/c.

Why not look into the CF-7 now . . . before the load problems of air conditioning are here. Let your G-E representative point out the ways you can benefit from this versatile instrument. If you wish more printed information, write to General Electric Company, Section 582-24, Schenectady 5, N. Y. for a free copy of Bulletin GEA-6104.

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REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
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Don't forget the

BOX NUMBER

When answering the classified advertisements in this magazine don't forget to put the box number on your envelope. It is our only means of identifying the advertisement you are answering.

• Brush control with "Ammate" three growing seasons after application! This Rockland Power and Light right of way was originally 100% brush. Photograph taken October 1956.

Why it pays to control brush with Du Pont AMMATE® X

WEED AND BRUSH KILLER

"Ammate" X is not volatile! . . . You can use "Ammate" on rights of way, even when they adjoin cropland planted to sensitive crops like cotton, soybeans, tobacco and peanuts.

"Ammate" X assures lower-cost, longer-term brush control . . . When the original spray job is done well, only occasional spot sprays are required to keep brush under control for years.

"Ammate" X kills roots of brush as well as tops . . . yet allows low-growing natural cover to come back.

"Ammate" X as a foliage spray . . . Kills more kind of brush and keeps it down longer than any other known herbicide.

"Ammate" X is easy to use . . . can be used without hazard to applicators, livestock or wildlife, as well as to nearby crops.

• Right of way near this transmission tower was treated with "Ammate" X brush killer, yet adjoining cotton crop remained completely unharmed.

WHERE WEEDS AND GRASS ARE A PROBLEM, you can rely on Du Pont "Telvar" weed killers for season-long control. Use "Telvar" around substations, pole yards and other areas where maintenance is tough and costly. Low dosages do the job. "Telvar" weed killers are wettable powders, are non-flammable, non-volatile, non-corrosive and low in toxic hazard.

On all chemicals follow label instructions and warnings carefully.

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REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

KUHLMAN "Salesman of the Week"

If you can identify this Kuhlman Electric Co. representative, and are the first one to notify Dept. SA-1, Kuhlman Electric Co., Bay City, Mich., you will receive a valuable gift certificate. Watch for the next Kuhlman "Salesman of the Week."

"Porcelain enamel will end your corrosion problems . . .

"Many of my customers have proved there is no need for expensive transformer repainting every few years. They changed to Kuhlman porcelain enamel transformers and are licking the problems of industrial fumes or coastal salt spray corrosion.

"Other transformer finishes, with special compounds for increasing protection, only coat the tank surface. In time, severe atmospheric conditions break down the cohesive film of these paints—they begin to flake and corrosion sets in. Now this doesn't happen to porcelain because porcelain frit is *permanently fused* to the tank metal at 1500°F.

"Most engineers agree that you can't beat porcelain for durability. It makes good sense to end your corrosion problems once and for all . . . install Kuhlman porcelain enamel transformers.

"Here's something else—Kuhlman porcelain transformers are equipped with non-corrosive hardware, too . . ."

1. Electrical bronze solderless connector.
2. Increased creep-distance to prevent salt deposit flash-over.
3. Stainless steel bushing clamps.
4. Bronze cover hold down nuts and pressure bar.
5. Bronze hand hole cover nuts.

Whether your corrosion problem is heavy industrial fume or severe salt spray, call in your competent Kuhlman representative for constructive advice.

5710b

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Quality Control at Allis-Chalmers

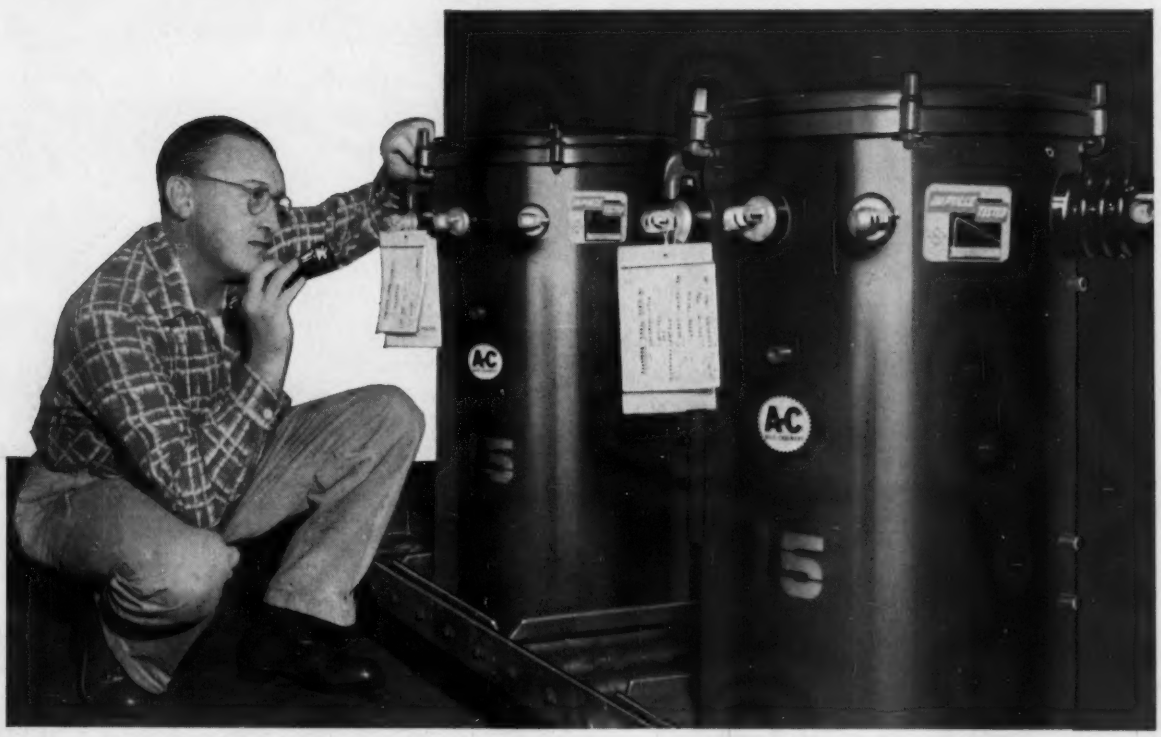
Little Things are Important, too

Inspecting high and low voltage connections to see that they are secure . . . making sure the tap changer is set correctly . . . checking the oil level . . . seeing that all gaskets are oiltight . . . measuring the gap setting on the lightning arrester . . . inspecting general appearance of tank . . . checking the nameplate data against order information . . .

Little things — all of them — but they serve to point up the depth of Allis-Chalmers quality control — the painstaking care taken to assure complete customer satisfaction. Only after passing this detailed inspection is an Allis-Chalmers distribution transformer ready for crating and shipment.

A Bulletin Tells the Complete Story

Bulletin 61B8355 on Quality Control is available from your nearby Allis-Chalmers representative. You can also get it by writing Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.



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